TECHNOLOGY DEPT.

ROADS AND STREETS

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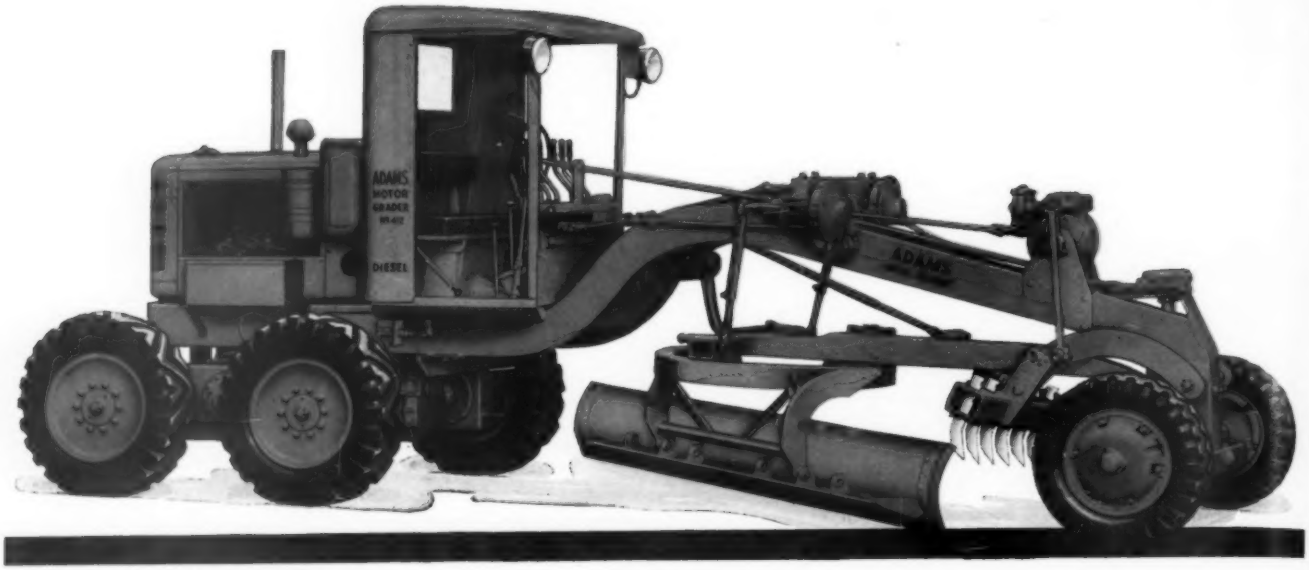
Blazing a trail through Virgin Forest

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

ONLY a logging road—but it's harder on the equipment than many a main highway construction job. The Le Tourneau Bulldozer and D7 "Caterpillar" Tractor were clearing ground and building about 500 feet of road a day — depending upon condition of material — when this photograph was taken, with Timken Bearings increasing speed and endurance; reducing lubrication and maintenance. The Timken Roller Bearing Company, Canton 6, Ohio.



10 Reasons WHY OWNERS PREFER ADAMS MOTOR GRADERS

★ Some day—in the not too far distant future, perhaps—you will be able to buy motor graders to replace wornout equipment. When that day arrives keep in mind that only in Adams Motor Graders do you get *all* of the following desirable features:

1 **STRENGTH AND DURABILITY**—Adams have the strength and stamina to stand up under continuous hard work. That is being demonstrated throughout the world by our armed forces.

2 **BALANCED DESIGN**—The weight is so distributed that the blade and scarifier can exert sufficient pressure to utilize the full power and traction of the machine.

3 **POWER AND TRACTION**—All models are powered by dependable International engines with lugging ability to hang on in tough going. Suitable traction utilizes full engine power.

4 **ADAPTABILITY TO WIDE RANGE OF JOBS**—Each model, from the smallest to the largest, is adaptable to any surface, ditch or bank work of which any motor grader is capable.

5 **WIDE RANGE OF SPEEDS**—Each model has a wide range of working speeds with a high top speed for quick transport.

6 **EASY STARTING**—Press the starter button and an International Diesel engine starts as easily as the engine in your automobile.

7 **DEPENDABLE OPERATING CONTROLS**—Adams mechanical controls are always positive and operate at uniform speed regardless of how many are used at one time.

8 **ECONOMICAL OPERATION**—International engines are economical to keep up and all working parts of the grader are adjustable for wear insuring long life.

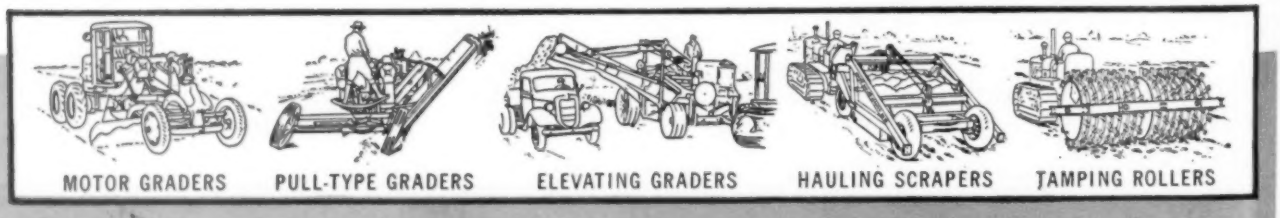
9 **WIDE RANGE OF MODELS**—The Adams line includes a size to suit your needs. (Present availability subject to wartime restrictions.)

10 **WIDESPREAD SERVICE AVAILABLE**—Adams machines are sold and serviced in every state and province of the United States and Canada and in more than 30 countries throughout the world.

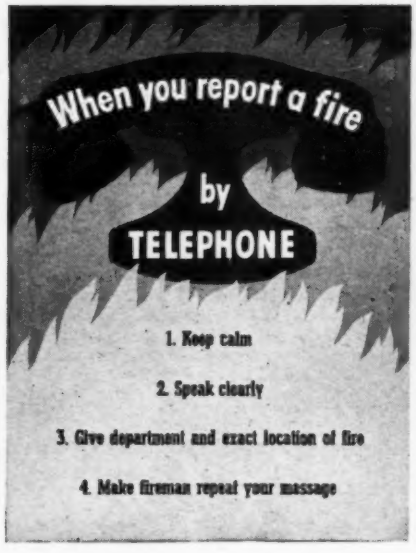
Let your local Adams dealer service your present equipment regularly to keep it rolling for the duration.

J. D. ADAMS COMPANY · INDIANAPOLIS, IND.

Buy More War Bonds for Victory
Plan Post-War Projects Now!

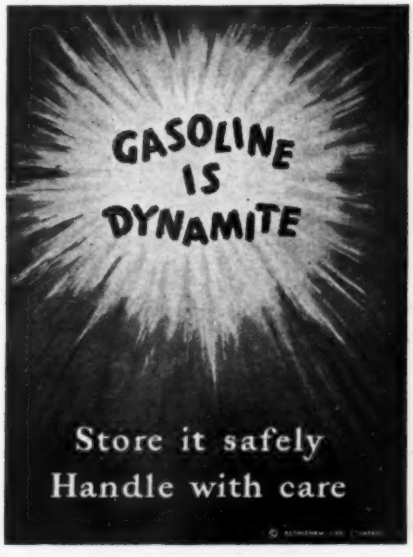


ADAMS ☆ ROAD-BUILDING AND ☆ EARTH-MOVING EQUIPMENT



COME ON ED— STOP DAY-DREAMING IN FRONT OF THAT POSTER
HOW TO USE A FIRE EXTINGUISHER
LOOK OUT, ED— SHE'S ON FIRE!
THAT DAY-DREAM KIND OF PAID OFF ... EH, BILL?

fighting fires with



POSTERS

Bethlehem has long had an efficient fire-fighting organization. But war conditions multiply normal fire hazards. Thousands of new employees have come to work. Large additions have been made to existing facilities, and entire new departments set up. At the same time, war needs have intensified the pressure for production.

Since the start of the war emergency Bethlehem has redoubled its effort to keep down production loss due to fires. Much new equipment has been provided: extinguishers, alarm boxes, sprinkler systems, hose outlets and fire engines. And as plants grew, fire-fighting personnel was expanded, and given special training.

BETHLEHEM STEEL

A poster campaign, of which a few representative samples are shown on this page, is one important detail of this program. Each poster registers in the employee's mind a single, specific point in fire-fighting or fire-prevention. Prominently displayed in steel plants, shipyards, fabricating shops, these posters are helping to maintain a favorable fire-loss record through the war years.

A fire on the production front can cost American lives on the battle-fronts. Even seemingly trivial fires have a grave cumulative effect. The aim is to prevent fires from occurring at all—and, if they do occur, to make them die young.

ROADS AND STREETS

Vol. 87, No. 2 • February, 1944

ECA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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HOW MANY OF THESE POST-WAR MILES WILL YOU BUILD?

The answer is right in your own hands

THE number of post-war miles you'll build depends largely on how well you do two things *right now!* **First**—talk up the need and advantages of prompt action on post-war highway construction programs among influential members of the communities you cover. **Second**—plan an organization and equipment set-up that assures you a competitive advantage when these jobs open up and bidding starts. Let your Lorain distributor act as right-hand man when planning your post-war equipment. He'll give you the last-minute information on the type of equipment needed to handle jobs scheduled for your area on the most efficient, economical basis. If you haven't done so already, start things moving by getting in touch with your nearest Lorain distributor today.

THE THEW SHOVEL COMPANY • LORAIN, OHIO

ESTIMATE OF NEEDED POST-WAR CONSTRUCTION ON FEDERAL AID AND STATE HIGHWAYS—38 STATES

State	*Estimated Total Cost Roads and Bridges*
Alabama	$ 57,532,000
Arizona	48,450,000
Arkansas	133,663,000
California	168,790,000
Colorado	78,504,000
Connecticut	243,300,000
Florida	115,843,000
Georgia	92,928,000
Idaho	23,760,000
Illinois	183,155,000
Indiana	160,861,000
Iowa	182,420,000
Kentucky	75,522,046
Louisiana	148,000,000
Maryland	86,146,000
Massachusetts	121,000,000
Michigan	340,009,000
Mississippi	77,278,500
Missouri	41,384,000
Nebraska	66,450,000
Nevada	38,049,370
New Jersey	193,590,000
New York	540,000,000
North Carolina	75,700,000
Ohio	580,000,000
Oklahoma	135,000,000
Oregon	150,000,000
Pennsylvania	449,768,000
Rhode Island	16,280,000
South Carolina	57,500,000
Tennessee	150,000,000
Texas	830,000,000
Utah	54,100,000
Virginia	110,753,000
Washington	65,200,000
West Virginia	179,300,000
Wisconsin	153,000,000
Wyoming	16,500,000
Totals	$6,215,975,916

(Figures Prepared by American Association of State Highway Officials)

thew Lorain SHOVELS

CRANES • DRAGLINES • MOTO-CRANES

You

wouldn't handcuff a PITCHER!

LAY·SET Preformed IS FREE!

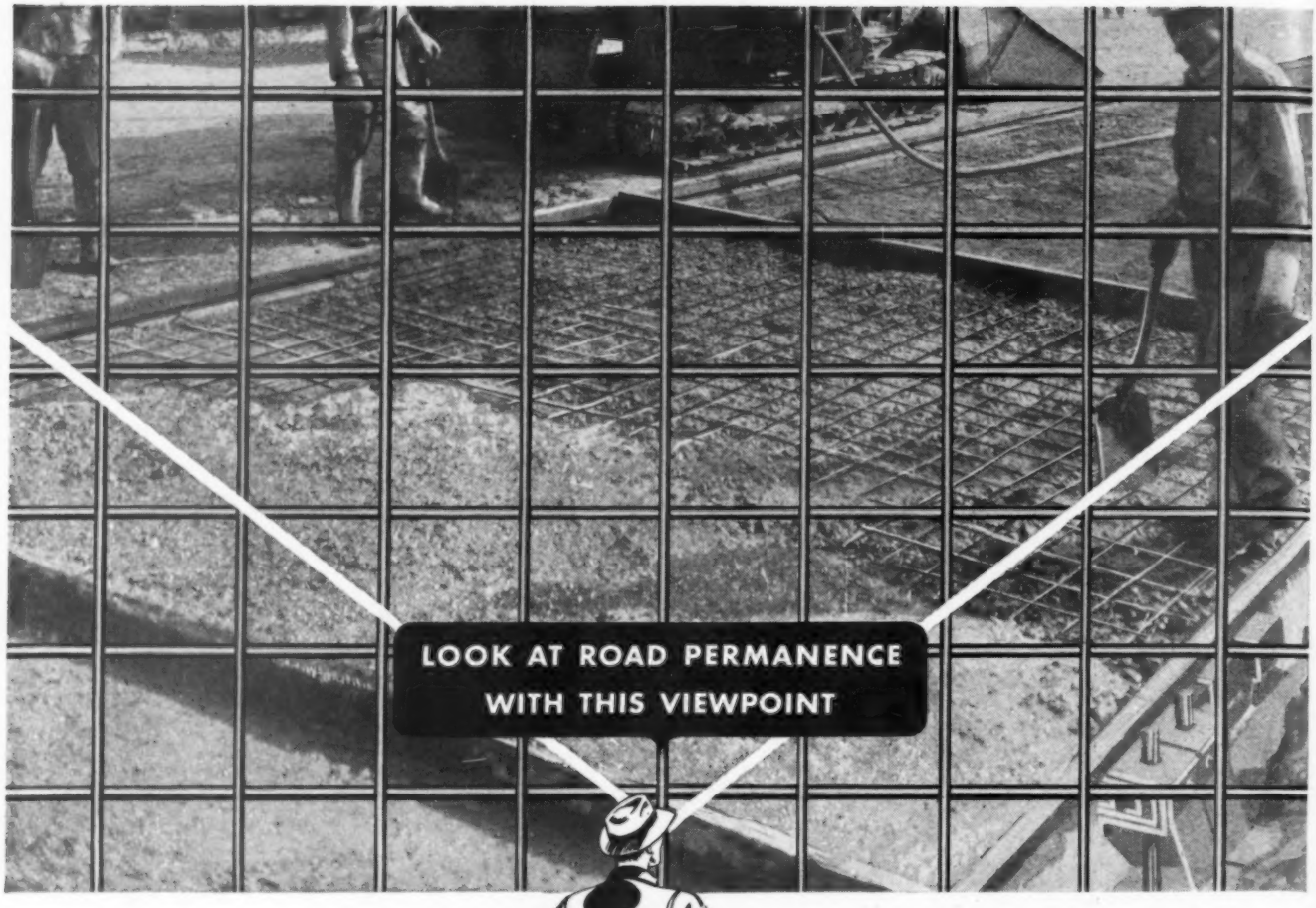
It is the preforming process that frees **LAY-SET** wire rope of self-destructive internal stresses. Being preformed, Hazard **LAY-SET** is not shackled by twisted strains. Rather, every wire and strand is free to do its full share of work from the very first hour it is put on your machine.

Hazard **LAY-SET** Preformed is a "pre-broken-in" rope; it resists kinking and snarling; it handles easier, faster, safer, and cheaper. It possesses high resistance to bending fatigue and so lasts longer—*much* longer than non-preformed wire rope. Regardless of where or how you use wire rope, whether for running or standing service, specify Hazard **LAY-SET** Preformed —the rope that gives you greater dollar value.

Ever since Pearl Harbor, and even before, Hazard **LAY-SET** Preformed has been saving time and money for the Government, the Armed Forces, and the taxpayer.

HAZARD WIRE ROPE DIVISION, Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Tacoma, San Francisco
AMERICAN CHAIN & CABLE COMPANY, INC. • BRIDGEPORT • CONNECTICUT

HAZARD LAY·SET Preformed WIRE ROPE



Truscon Welded Steel Fabric Helps Build the BEST ROADS!

Safeguard public funds in the highways which you plan . . . assure long-lived, full-value highway construction . . . by depending upon Truscon Steel Fabric for road protection.

Here's what Truscon Welded Steel Fabric assures:

Provides resistance to cracking due to shrinkage of concrete during setting period.

Provides tensile strength necessary to resist subgrade friction.

Provides increased resistance to cracking in concrete slabs, which has been created by the expansion and contraction of subgrades.

Provides increased resistance to cracking of concrete due to load.

Prevents the development of microscopic cracks into visible cracks.

Prevents cracks from opening and allowing entrance of water.

Prevents broken ends of slabs from separating at a crack.

Decreases spalling and progressive breakage.

All these, and other advantages, will help build more wear-life into public highways with Truscon Welded Steel Fabric Reinforcement and associated roadbuilding products.

TRUSCON
Steel Company

SUBSIDIARY OF REPUBLIC STEEL CORPORATION • YOUNGSTOWN 1, OHIO

Positive Control FOR ACCURATE SPOTTING

DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment *NOW*, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

Independent Boom Control . . .

saves seconds on material handling work. Independent boom control permits accurate handling of piling for high speed pile driving on bridge and building construction projects. Raising or lowering the boom while swinging or traveling is a second-saving feature. Koehring Cranes are high speed, easy handling, have accurate and positive control. The many time-saving advantages of Koehring means speed on the job, more work per shift, less man power . . . waste motion is reduced to a minimum, every move is a production move.

KOEHRING COMPANY
Milwaukee 10, Wisconsin

ARMY E NAVY

KOEHRING K HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

SISALKRAFT

Road Blankets Are Now Protecting War Supplies from Ice, Sleet and Snow!

The ability of SISALKRAFT to withstand the terrific abuse it is getting in war service is due to the same qualities that make SISALKRAFT so much in demand for protecting newly poured concrete and for general job protection. This tough material, an essential war need, is used to protect war supplies enroute to fighting fronts.

Weatherproof, scuffproof and tear resistant, SISALKRAFT is the ideal "wrapper" for war goods subject to rough handling and exposed to ice, sleet, rain, snow, dirt and salt water. Protecting deck loads as well as cargoes in the hold, SISALKRAFT is taking terrific abuse — more than it would ever get on a concrete job — and coming through with flying colors!

When Victory is won, SISALKRAFT blankets, covers and rolls will again be at your service—with an unmatched record of achievement in aiding our Nation and our Allies.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

Here's One Underground Movement You Can Support!

After Hitler and Tojo are safely locked up in padded cells, America will have a chance to catch up on much needed construction work—new highways, new homes, new airports and the conversion of war plants to peace-time production.

The underground movement will be tremendous—there'll be need for more trench than would reach from here to Hell and gone. You'll be all set to cut yourself in on a piece of trenching profit with a fast, compact, rugged-but-not-overweight Buckeye Trencher. Rotary digging wheel and ladder types in sizes for every service.

Buckeyes are available under priority regulations—plan now for when they will be available to you—send for Trencher Catalog.

P E A C E
WILL BRING NEW CONCEPTS IN TRENCHING

The Air Age, ushered in by the war, calls for burial of much of the electric and telephone wire and cable formerly strung on poles—advanced methods in herringbone and lateral subgrade drainage of highways to protect the surface material—drainage to prevent soil erosion and to reclaim land—gas and city water made available to more homes—these are a few of the future trenching jobs awaiting Buckeyes.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Built by Buckeye

Convertible Shovels · Road Wideners · Trenchers
Spreaders · B-B Power Finegraders · Tractor Equipment

SINGLE VALVE CONTROL

Top Photo: "Spray Master" with Vaporizing Torch Type Burners and Rear Engine Mounted.

Lower Photo: "Spray Master" with Low Pressure Atomizing Burner and Front Engine Mounted.

One valve Starts and Stops the spray instantly! Here is one reason why the Littleford "Spray Master" Pressure Distributors will definitely speed up the Construction and Maintenance of our vital post war highways, roads, streets and airports. This Single Valve Control, the exclusive "Spray Master" feature eliminates the maze of gadgets, controls and valves found on units of this type. Littleford again leads the way to modern, efficient Black Top Construction and Maintenance Equipment. When planning for the future, consider equipment designed for the future.

BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE 1900

LB LITTLEFORD

Littleford Bros., Inc.
454 E. Pearl St., Cincinnati, Ohio

FWD's LEAD ALL OTHERS — KEEPING AIRPORTS — HIGHWAYS — CITY STREETS CLEAR — THROUGHOUT THE SNOW BELT »

First choice for the fastest, least in cost and most dependable method of clearing snow—from airport runways, highways or city streets—is the FWD Truck. There are more FWD trucks used in snow removal than any other make of truck or tractor. Unbiased surveys, covering every state in the Union, and many Canadian provinces as well, show that FWD's are a 4 to 1 leader in this severe service.

FWD is the preferred truck for fast, low-cost snow removal, because it has the full power of four driving wheels—the ability to smash its way through the toughest and deepest drifts—do a clean job in far less time — and still be thrifty with operating costs.

The wide range of gear ratios, tremendous reserve power, the full and balanced traction of four driving wheels make it possible for FWD's to deliver more work-output per truck dollar . . . whether it's clearing snow, doing regular maintenance jobs around the airport or on the highway, or just plain "trucking freight" on schedule. Investigate the truck that yields the biggest all-year, all-season returns—an FWD.

CLEAR AIRPORTS .. OPEN ROADS *are vital to the War Effort!*

FWD TRUCKS

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wisconsin

Canadian Factory: KITCHENER, ONTARIO

HINTS FOR WINTER OPERATION AND MAINTENANCE OF FWD SNOW REMOVAL TRUCKS

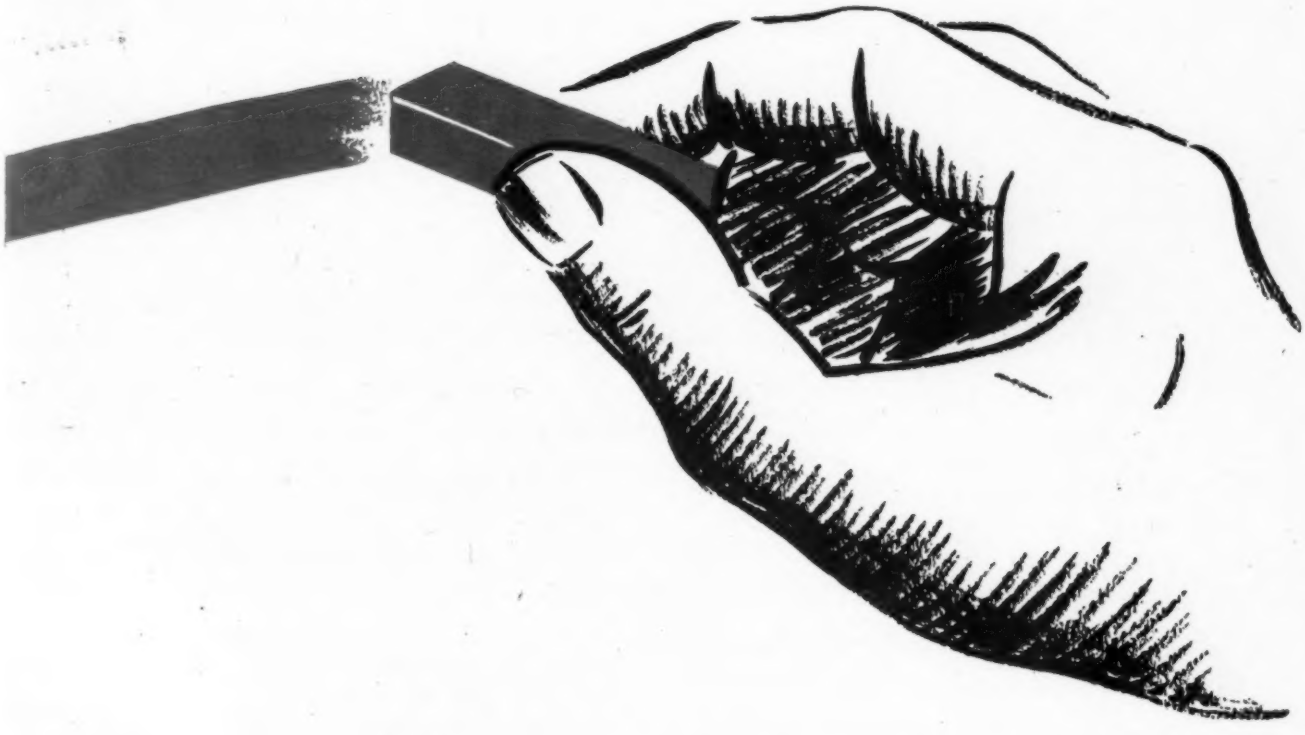
Care of engine. Change engine oil frequently enough, based on total hours of operation. Keep cooling system clean and free of rust. Use radiator hood or automatic shutter to control engine temperature.

Conserve tires. Single tires are best for snow removal. Use closely-spaced chains—not emergency chains—on all four wheels, for better performance and economy.

Storing and inspection. House trucks inside when not in use, to increase their life. Periodically check for needed replacements. Remember FWD's progressive interchangeability of parts.

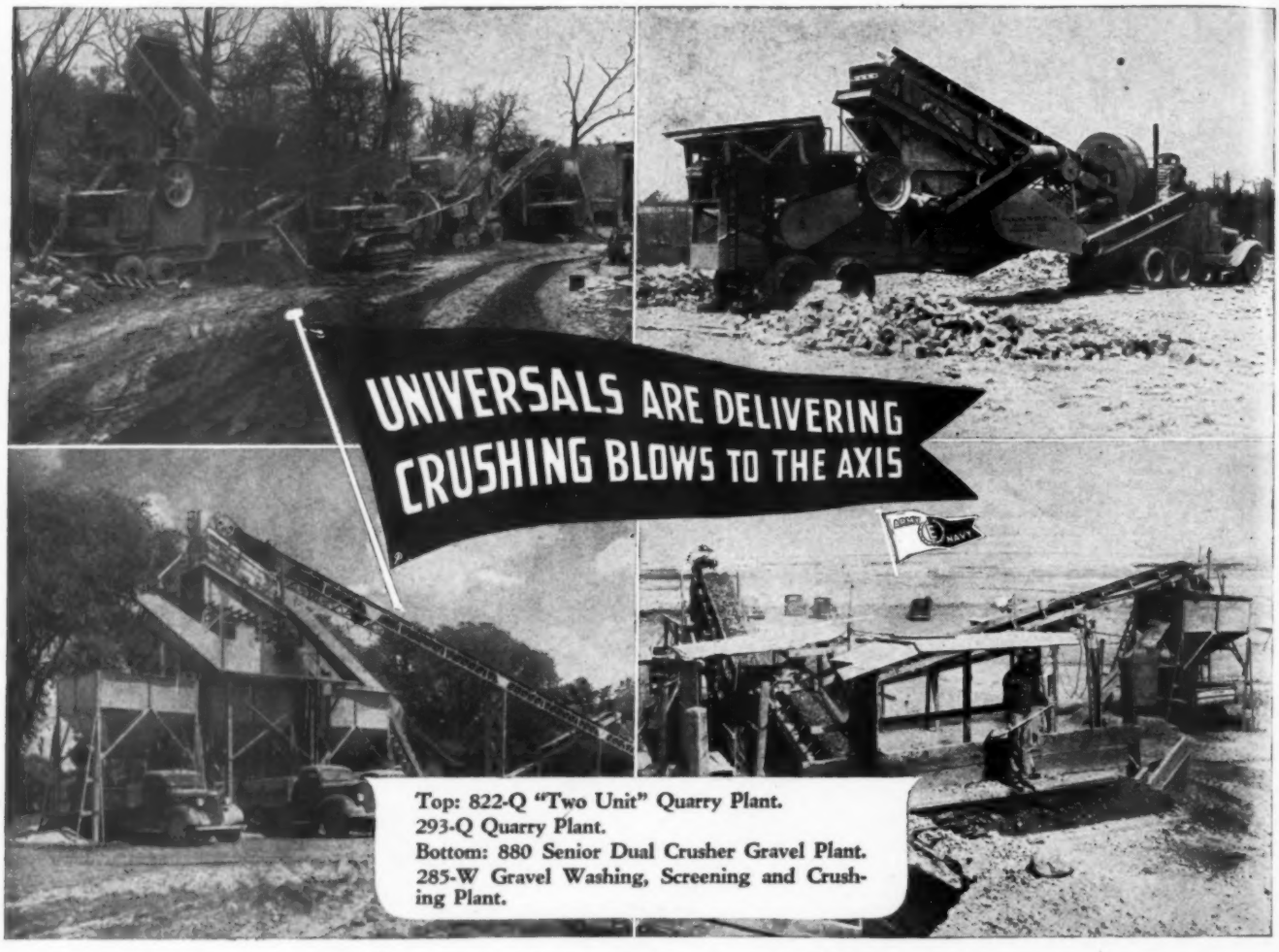
Rich

kraft



Richkraft BUILDING PRODUCTS

BUILDING PAPER
SUB-GRADE PAPER
CURING COMPOUNDS • TARPAULINS
PRISMO REFLECTING PAINT
"SEALZ" JOINT SEALER

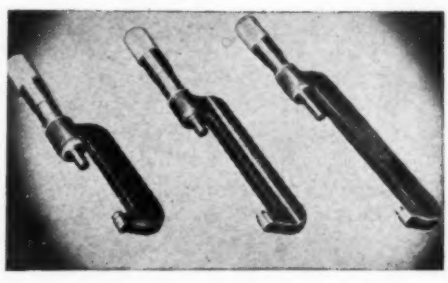


Top: 822-Q "Two Unit" Quarry Plant.
293-Q Quarry Plant.
Bottom: 880 Senior Dual Crusher Gravel Plant.
285-W Gravel Washing, Screening and Crushing Plant.

CRUSHED rock and gravel—in tremendous volume—is essential ammunition in the present war. Roads must be built in days instead of months, and concrete structures must literally spring from the ground. The speed with which this work is done is a typical case of American-built equipment giving important advantages over the enemy.

On every front, Universal crushing plants and rock and gravel crushers have speeded up the work. On the Alaska Highway, on South Pacific islands and elsewhere, they have established production records and functioned faithfully with minimum maintenance, so important in emergency construction. On the home front, Universal crushing equipment has done its share in the rapid building of access roads, runways and other military installations.

Universal is also producing pulverizers for fertilizer and explosives plants, and we are making a direct contribution to the war effort in the production of army ordnance equipment which we have been called upon to build. At right are gages made in our toolroom for use in producing precision parts in our shops.



UNIVERSAL ENGINEERING CORP.

631 C Avenue W., Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Nothing changed but the paint

EVERYTHING changed but the paint

LONG before Pearl Harbor your government called International Diesels to the nation's defense. Regulation olive-drab replaced the familiar red, and the big tractors of industry went to war. *Almost nothing was changed but the paint.*

These peacetime crawlers are writing war history in stirring action. They're pulling big guns, handling bombs for the Air Forces, smoothing shell-torn landing fields, clearing jungles, building roads. Tens of thousands of such International Tractors are valiantly supporting the Marines, the Navy, and the Army. Night and day we're building more. They're tops on every fighting front.

But that's not enough for American resourcefulness under the spur of war.

In 1943 a new "prime mover" rolled from the International assembly lines—a tractor in which *EVERYTHING was changed but the paint!*

• Here's a revelation in crawler power, maneuverability and fighting quality . . . a high-speed performer under heavy load . . . a go-getter whose rugged construction and ease of handling will carry far beyond the Victory.

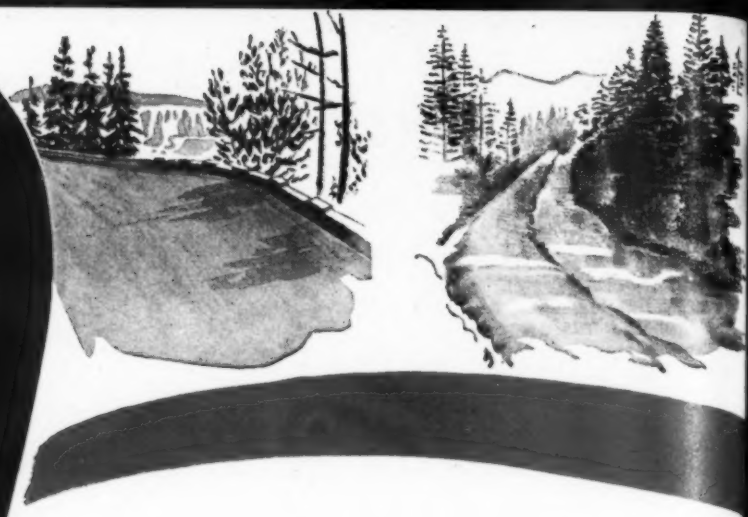
Victory is its one job, but there'll be a world to rebuild later. Then we'll build the International Diesel Crawlers you need. And you'll know why Harvester men are saying today: *"We've got a lot of things packed into this big baby that we'll use when the war is over!"*

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

BUY BONDS···BUY MORE BONDS

INTERNATIONAL HARVESTER

"Make NO little PLANS"

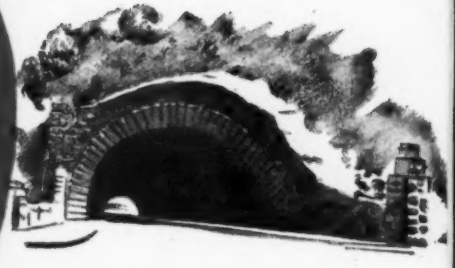


The task is great... the incentive tremendous... the goal can be reached if sights are set high!

THE GOAL is a highway system based upon actual post-war needs. To make up for lost time, a doubled highway construction program will be necessary for at least three years. Actually, the program should be more than twice the pre-war size, because highway construction was far behind real needs when this nation entered the war. On the state systems, there is tremendous need for new construction... new and wider pavements, bridges, grade separations. In cities, the problems are equally acute. Supplementing the state systems and city streets is a vast network of county, township, and village roads totaling 2,400,000 miles, and serving 6,000,000 farms having an annual production of $12,000,000,000. Only a sound, planned construction program for these secondary roads can provide needed services, and eliminate exorbitant maintenance charges.

THE INCENTIVE is a post-war national economy with the full employment and high national income that exist when, and only when, construction activity is at a high level. All studies show that public works construction is essential to the nation's economic health. Being easily controllable, planned public works can be made to take up the slack in employment that is bound to occur in private construction.

Jobs must be waiting when the war is over... jobs for eight to ten million men in the armed services when they come home.



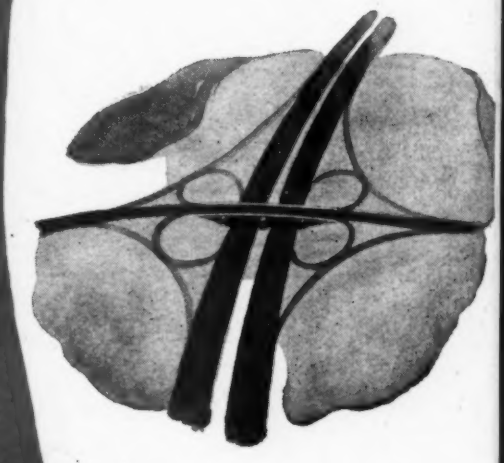
An adequate highway program guarantees large-scale employment, not only on roads and streets, but also in allied industries.

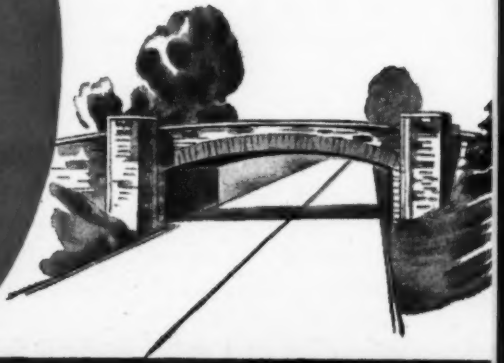
THE TASK facing the highway profession is that of providing for the full-sized post-war highway program that will meet the nation's economic needs. Great danger lies in the lack of realization of the size of the job to be done. The post-war program must be in BILLIONS if it is to fulfill its purpose, both in meeting the demands of traffic and sustaining its part in the national economy.

There must be a reservoir of highway projects of sufficient size to insure an annual program of three billion dollars. Every state, county, city, and regional area should have a program of highway construction *complete with plans, specifications, and cost-estimates.*

The post-war period will be a challenge to American ingenuity, and the highway profession will meet the challenge. But not with LITTLE plans. Little plans will not get rid of worn-out, obsolete roads and streets, unsafe bridges, and traffic congestion. Little plans will not build express highways between cities, or arterial routes into and through cities. Little plans will not provide the sound program, based upon the nation's economic needs and actual highway needs, which will pay dividends far beyond the cost. Make no LITTLE plans!

AUSTIN-WESTERN COMPANY
Aurora, Illinois





BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859

BUY MORE WAR BONDS

Try RING-FREE on your toughest jobs!

Cutting a secondary road is a tough job as every construction man knows. The equipment in the above photograph is lubricated by Macmillan RING-FREE, a tough Motor Oil for the toughest jobs.

RING-FREE "stays in there and takes punishment"... protects a hard-working engine with its ability to reduce friction *fast*. And Macmillan RING-FREE *removes carbon* while the engine runs! That helps many a piece of motorized equipment to better performance and longer life with less down time for repairs.

If you're having trouble with hard carbon, excessive wear, high fuel and oil consumption on your tough jobs, try Macmillan RING-FREE!

If you're "from Missouri", skip the soft spots . . . put Macmillan RING-FREE Motor Oil in the crankcase of the motorized equipment that is subject to your severest test! Here is what it does:

Macmillan RING-FREE Motor Oil *removes* carbon while the engine runs! The result is a cleaner, more thoroughly lubricated, sweeter running engine. And continued use of RING-FREE keeps carbon in check.

Furthermore, RING-FREE Motor Oil reduces friction *fast*! Internal engine friction is reduced to the extent that it's measurable in fuel savings as more power is delivered to the drive shaft. The fast penetrating quality, high film strength, high heat resistance and long cling to metal of Macmillan RING-FREE—contributing to reduction of friction—cuts down wear and repair. It pays to improve the performance and lengthen the life of all types of Diesel and gasoline engines with RING-FREE!

MACMILLAN PETROLEUM CORPORATION

50 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. 6th Street, Los Angeles 14

Copyright 1944, Macmillan Petroleum Corp.

MACMILLAN
RING-FREE
MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION

O·K·to LAND

"O.K. to land" says the control tower and this PAA Strato-Clipper glides in to a smooth landing. The fully-equipped terminal and level paved runways of this Latin American airport were mere engineer blueprints not long ago.

Above: B-G Tamping-Leveling Finisher for building runways or streets—Fast and right.

This is but one of scores of airports on the globe-girdling routes of Pan American Airways built from scratch or vastly enlarged as the demands of war stepped up the tempo of air transport. They were hacked out of jungle, built on filled-in swamp and sandy ocean isles, using modern construction equipment. Barber-Greene Finishers substituted level runways for corduroy roads, for wind-blown sand, for feverish swamp. In YOUR planning, get complete Barber-Greene information first. 44-2

BARBER-GREENE

AURORA, ILL.

A mud-spattered windshield. In the glare of oncoming headlights, the driver missed his turn — and an irreplaceable truck is lost to the war effort.

The importance of frequent safety check-up at major points need not be stressed to fleet operators. Here are some other less obvious safety points, often overlooked . . . .

Be sure fire extinguishers are in good working order and properly located for instant use. Replace cracked or discolored windows and windshields. Be sure directional signals are working properly. Don't set up schedules which call for excessive speeds. Impress on operators the danger of high speeds under today's conditions. If necessary, install governors (available on proper priorities). Don't neglect faulty windshield wipers. Above all, enlist the cooperation of drivers. If they understand the extra wartime importance of observing safety rules, they will be more careful in observing them.

● Our war job is to turn out heavy wreckers and military fire equipment. This assignment requires our all-out effort from a production standpoint. However, our engineers will be glad to work with you now in the development of fire equipment or commercial trucks engineered to your postwar needs.

WARD LaFRANCE
TRUCK DIVISION
ELMIRA • NEW YORK

© 1944 G. A. I., Inc., Meriden, Conn.

LEFT: 2-Cycle Diesel being taken into Walling's shop for check-up and repairs.

CENTER: After several thousand hours of steady service, the HD-7 is shown undergoing the complete overhaul — which included removing the motor and "taking it down" — installing new sleeves, pins and rings, new main bearings, new valves and reseating heads, new filters, new fan belts, new flame heater switch and motor, and overhauling the oil pump-blower and water pump. The left hand final drive was removed and new seals, one track sprocket and rear axle bracket were installed. Steering clutch brakes were relined, steering clutches adjusted and batteries recharged. The tracks were adjusted and track bolts installed, where necessary. In addition, the bulldozer was repaired and logging drum tightened. Plenty of work to get done in 3½ days!

BELOW: It leaves the shop, ready to perform with the efficiency of a new outfit.

IT PAID DIVIDENDS

Proves Worth While To Have Tractor Repaired In Dealer's Shop

Salem Sand & Gravel Co., big-time contractor operator in Salem, Oregon, received a tip that really paid off when they called Walling Tractor & Equipment Corp., Allis-Chalmers dealer at Portland, Ore., for a service man to make adjustments on its 2-Cycle Diesel tractor.

Knowing that the tractor had been run steadily on tough work for several years without an overhaul . . . Walling suggested that it be taken into their up-to-date shops for a complete check-up — where special tractor tools and a skilled crew of mechanics were right on hand. He also suggested that the tractor operator accompany the unit to approve the work and to pitch in and help — thereby cut the time and cost of the job and learn more about the outfit he was running.

This contractor immediately saw the advantages of having the job handled this way and readily agreed. That it paid dividends is shown by the amount of work the tractor required (see center caption) and the short time in which it was accomplished — only 3½ days — regardless of the shortage of manpower and critical materials. Now it's performing like a new unit — paying off for the work done.

It will pay you dividends, too, to have major repairs handled in your A-C dealer's shop. Like Walling Tractor & Equipment Corp., your Allis-Chalmers dealer is fully equipped to help you. Let him put your outfits in A-1 condition . . . get peak performance NOW!

ARMY NAVY

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE, U. S. A.

LOOK AT THAT SPREAD!

High-Speed Spreading Action of WALTER SNOW FIGHTERS Makes Widening-Out Easier!

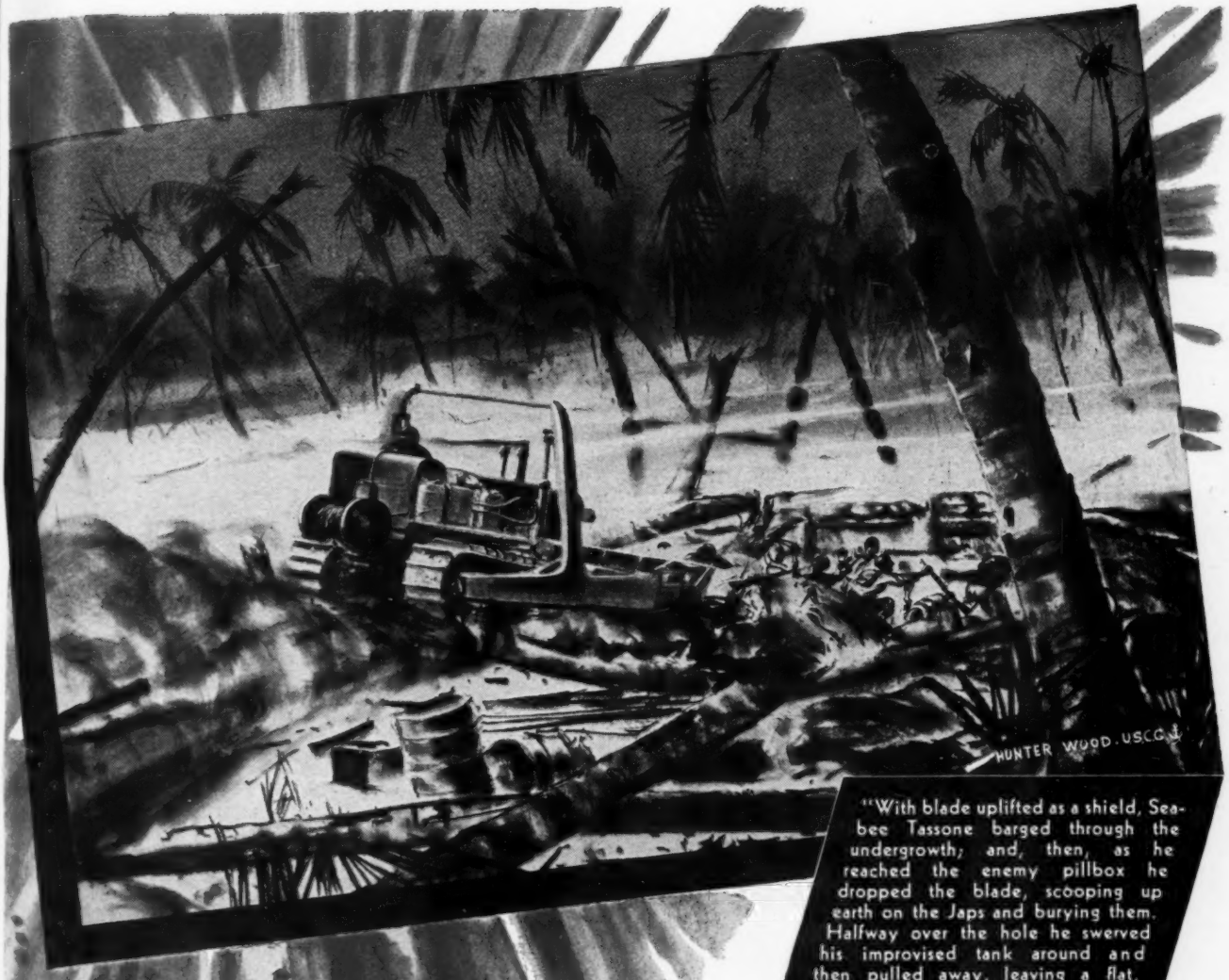
BY punching through deep snows at high speeds on the opening run, Walter Snow Fighters throw snow far to the side, instead of merely turning it over. This spreading action prevents the formation of the high, abrupt banks which slow down widening-out work.

The exclusive Walter Four-Point Positive Drive makes this high-speed performance possible by turning tremendous power into smooth, positive traction. Three automatic locking differentials proportion the torque to FOUR driving wheels according to the traction of each at any instant. Power is not wasted spinning wheels with least traction. If one wheel loses traction momentarily, its mates continue to operate under full power.

Other features which contribute to the all-around superiority of Walter Snow Fighters are Suspended Double Reduction Drive for greater gear capacity, reserve power, higher ground clearance and less unsprung weight – tractor type transmission – scientific weight distribution – and many others. Write for detailed literature.

WALTER SNOW FIGHTERS

WALTER MOTOR TRUCK CO., 1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.



"With blade uplifted as a shield, Seabee Tassone barged through the undergrowth; and, then, as he reached the enemy pillbox he dropped the blade, scooping up earth on the Japs and burying them. Halfway over the hole he swerved his improvised tank around and then pulled away, leaving a flat, smooth area and no trace of the Japs." (Courtesy Associated Press)

MAYBE *YOUR* BAKER DID THIS JOB!

If you have been temporarily denied a Baker Bulldozer, there is satisfaction in knowing that maybe *your* Baker made history at Guadalcanal!

THE BAKER MFG. CO.
506 Stanford Avenue
Springfield, Illinois

BULLDOZERS SNOW PLOWS **BAKER** CONSTRUCTION EQUIPMENT

YOUR PEACETIME AGGREGATE PLANT is being tested in New Guinea!

Cedarapids

Built by IOWA

YOU can't build "too good" for war! But there have been manufacturers who have thought there was a limit to quality requirements for peacetime service. That hasn't been the slant that Iowa Engineers have taken on the development of Cedarapids equipment, and, if it was not for the terrible phases of the picture, we would welcome the opportunity the war presents to test and learn about Iowa performance under wartime's terrific stress for the improvement of peacetime equipment.

Cedarapids equipment has met and is satisfying the problems of war. A plant a day rolls out of the great Iowa assembly bay to some battlefront. The enormous wartime effort, *unequalled in this specific field of production by any other manufacturer of similar equipment,* will give Iowa an *experience* that will mean aggregate producing equipment that will be ever *more profitable* for the American contractor.

Talk to contractors that are using Iowa aggregate and asphalt plants. Check the records that Iowa plants are establishing for production. Find out about Iowa's low operating and maintenance costs.

Whether it is crushers, screens, bins, asphalt plants, driers or washing plants, Iowa is Headquarters for aggregate reduction and handling equipment. Can we help you with your plans?

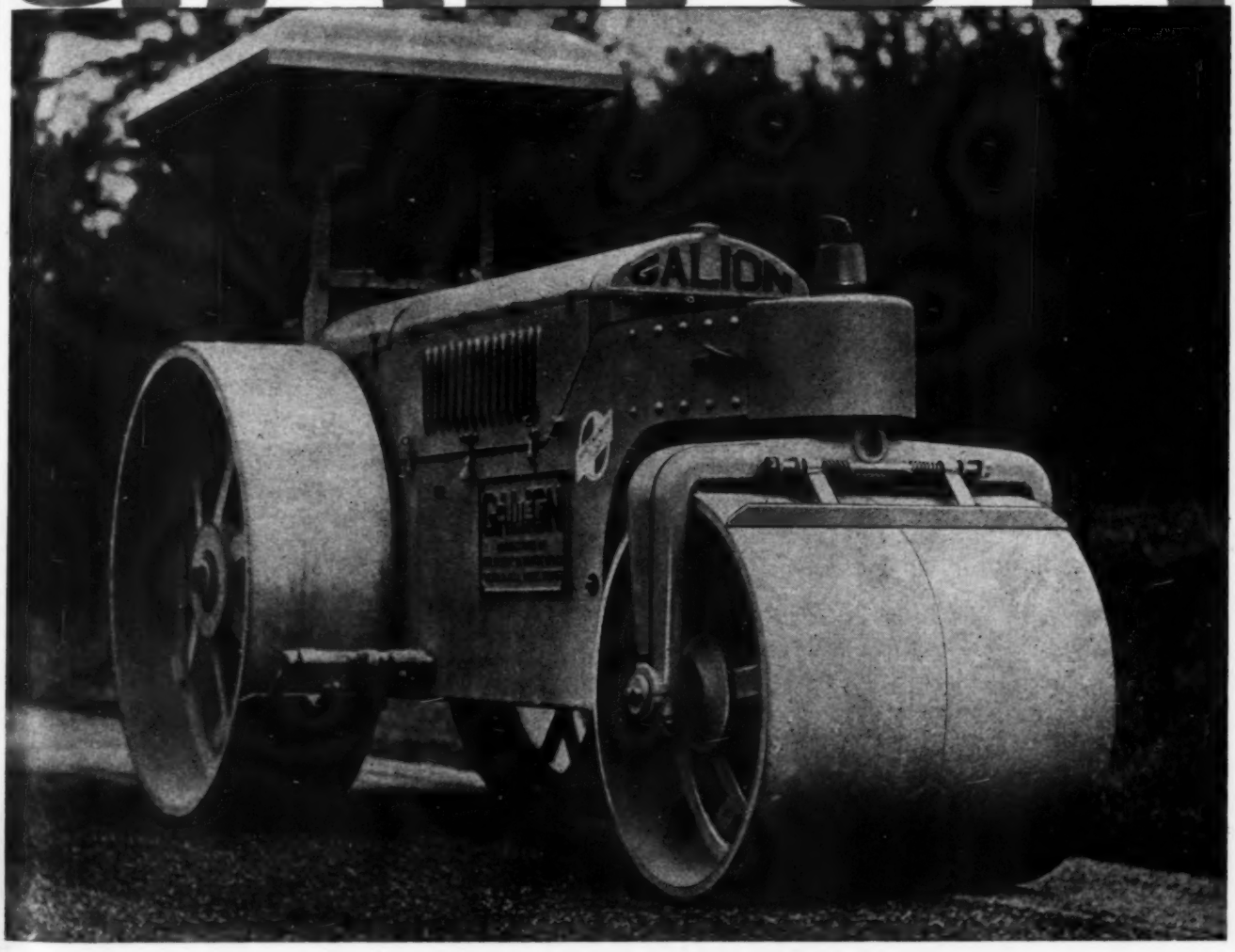
THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS — STEEL BINS
BUCKET ELEVATORS
FEEDERS — TRAPS
PORTABLE PLACER MACHINES
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
TRAVELING (ROAD MIX) PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS

IOWA MANUFACTURING CO. Cedar Rapids, Iowa

GALION



THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

ROLLERS • MOTOR GRADERS • SPREADERS

Buy WAR BONDS!

They've "BLACKHAWK HYDRAULIC-EQUIPPED"

LONG before the war, leaders in many fields, whose trademarks you respect, proved the remarkable efficiency of Blackhawk Hydraulic Controls.

Today, Blackhawk Power-Packer HYDRAULIC Units are proving their many advantages to an extent far beyond prewar conceptions...forecasting still greater achievements in the postwar era to come. Whether your needs are for hand or power control, service-proved Blackhawk Hydraulic units assure you dependable power for lifting and lowering — with speedy action, peak efficiency, and remarkable accuracy and ease of control.

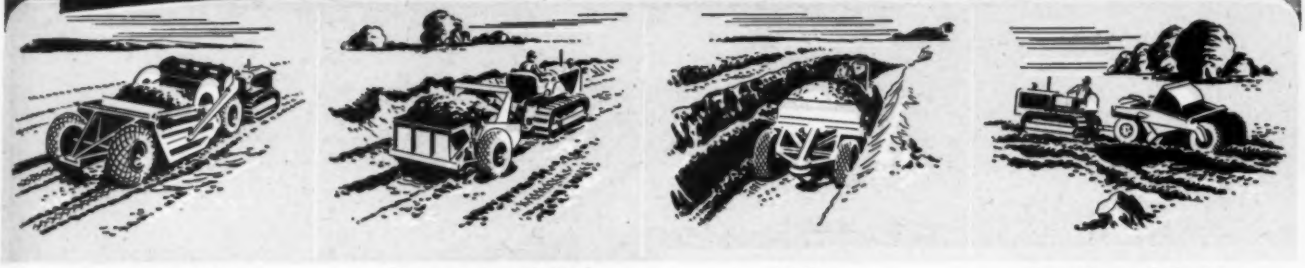
Specify "Blackhawk Hydraulic controls" when modernizing or buying equipment....For complete list of advantages, write your equipment manufacturer — or write us direct.

A Product of **BLACKHAWK MFG. CO., Dept. RS, Milwaukee, Wis.**

BLACKHAWK

Hydraulic Equipment

Are you taking full advantage OF ALL THE JOBS YOUR SCRAPERS CAN DO?



Stripping Top Soil

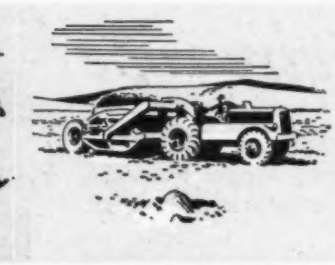
Making cuts and fills

Ditching

Spreading and Finishing

Long Haul Excavation

Opening Borrow Pits



Leveling and Grading

Dam and Levee Construction

Get Your Post-War Plans On Paper Now!

Help eliminate "leaf raking" and "made work" later by planning and promoting worthwhile construction projects now. Make your plans specific—with detailed blueprints and estimated costs worked out as closely as possible. And by all means, call in your contractors early, so that equipment and job requirements can be planned well in advance of actual needs.

Wherever you've got the problem of moving large quantities of dirt more than 300 feet, the job can usually be done faster, cheaper, better with tractor-drawn scrapers that *dig, haul, and spread their own loads.* The typical illustrations above are only a few of the hundreds of practical applications for these thrifty, versatile machines. And remember, every *extra* job you assign to LaPlant-Choate "Carrimor" scrapers enables you to save precious manpower and release less adaptable equipment for other vital war work. See your nearest LaPlant-Choate "Caterpillar" distributor for helpful job application data, plus efficient parts and repair service, designed to keep your scraper equipment working *full-time* for Victory. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

ARMY E NAVY

LaPLANT-CHOATE

Earthmoving and Land Clearing Equipment

BACK OF EVERY ATTACK–

Preformed wire rope

A tiny torpedo boat races toward the enemy to deliver the kiss of death. A young skipper mans the wheel—and Preformed wire rope helps steer the craft over sub-infested waters.

The PT lets go its torpedoes. Then twists and dodges to keep out of enemy fire. And Preformed wire rope helps it get away.

Where lives are at stake, Preformed has proved its superiority. That's why on PTs—it's Preformed.

Wherever the Allies attack, Preformed is on the job, proving its flexibility, its longer life—and its ability to save precious time.

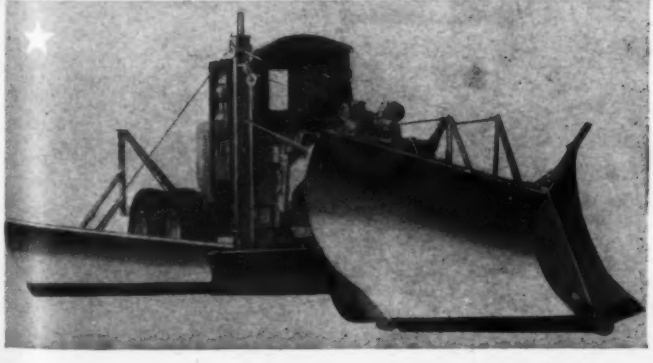
That's why back of every attack—there's Preformed wire rope.

Ask your own wire rope manufacturer or supplier for Preformed wire rope

WARCO

HYDRAULIC CONTROL MOTOR GRADERS

Simple Design—Rugged Construction—Long Use—Hard Wear.



★ **For precision work in rough terrain.**

★ **For super-highway building in all altitudes and climates.**

★ **For a full blade's worth of earth in grading.**

★ **For snow removal through tough drifts.**

WARCO Graders are "war tested." This means they meet high standards of efficiency, endurance and dependability—great qualities to benefit WARCO users in peace-time construction.

Now available only on WPB releases or approval—but ready for reconstruction work when it comes.

Hydraulic Scoops
Variable Weight Rollers
Multiple Blade Maintainers

WARCO **W. A. RIDDELL CORPORATION**
BUCYRUS - - OHIO

ILLINOIS STATE HIGHWAY ENGINEERS

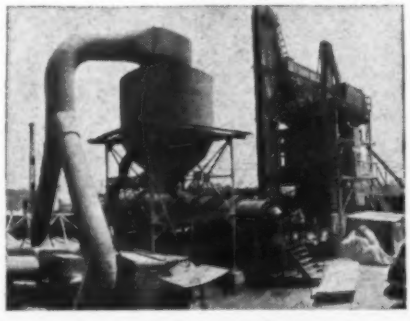
find Asphalt the ready answer to wartime resurfacing

• In meeting the problems of resurfacing heavily traveled trunk highways, Illinois highway officials have shown vision and resourcefulness in adopting Asphalt as the made-to-order solution. Illinois recognized these advantages of resurfacing with Asphalt:

1. Asphalt utilizes the materials at hand. It can be laid right over the existing pavement, whether brick, asphalt or concrete.
2. It requires comparatively little manpower.
3. The job is done quickly.
4. There is no interruption to traffic.
5. Experienced contractors have equipment and road building machines necessary, and stand ready to carry through the resurfacing program.

The hundreds of miles of asphalt resurfacing along Illinois' arterial routes bear testimony to the wartime effectiveness, as well as the peacetime soundness, of this peer of paving materials—every mile contributing its share in conserving vital transport equipment—cars, trucks, buses, and tires.

The help and experience of Standard Oil Asphalt Representatives is at the service of highway departments and contractors, in carrying out any highway resurfacing program. Write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.



Illinois' Method of Asphalt Resurfacing. Illinois uses the most modern equipment and methods to complete the resurfacing jobs as rapidly as possible, to save manpower, and to eliminate any interruption to traffic while work is in progress.

Work is speeded by the use of asphalt finishing machines which lay hot-mixed asphaltic concrete delivered from a central mixing plant by truck.

Half of the highway is resurfaced at one time, which leaves one lane open for traffic. The resurfaced portion is ready for use as soon as it has cooled—or the next morning.

The general steps in construction are as follows:

Spot Patching—Where the old highway is badly broken, holes are patched by filling with the same mix as used in the binder course.

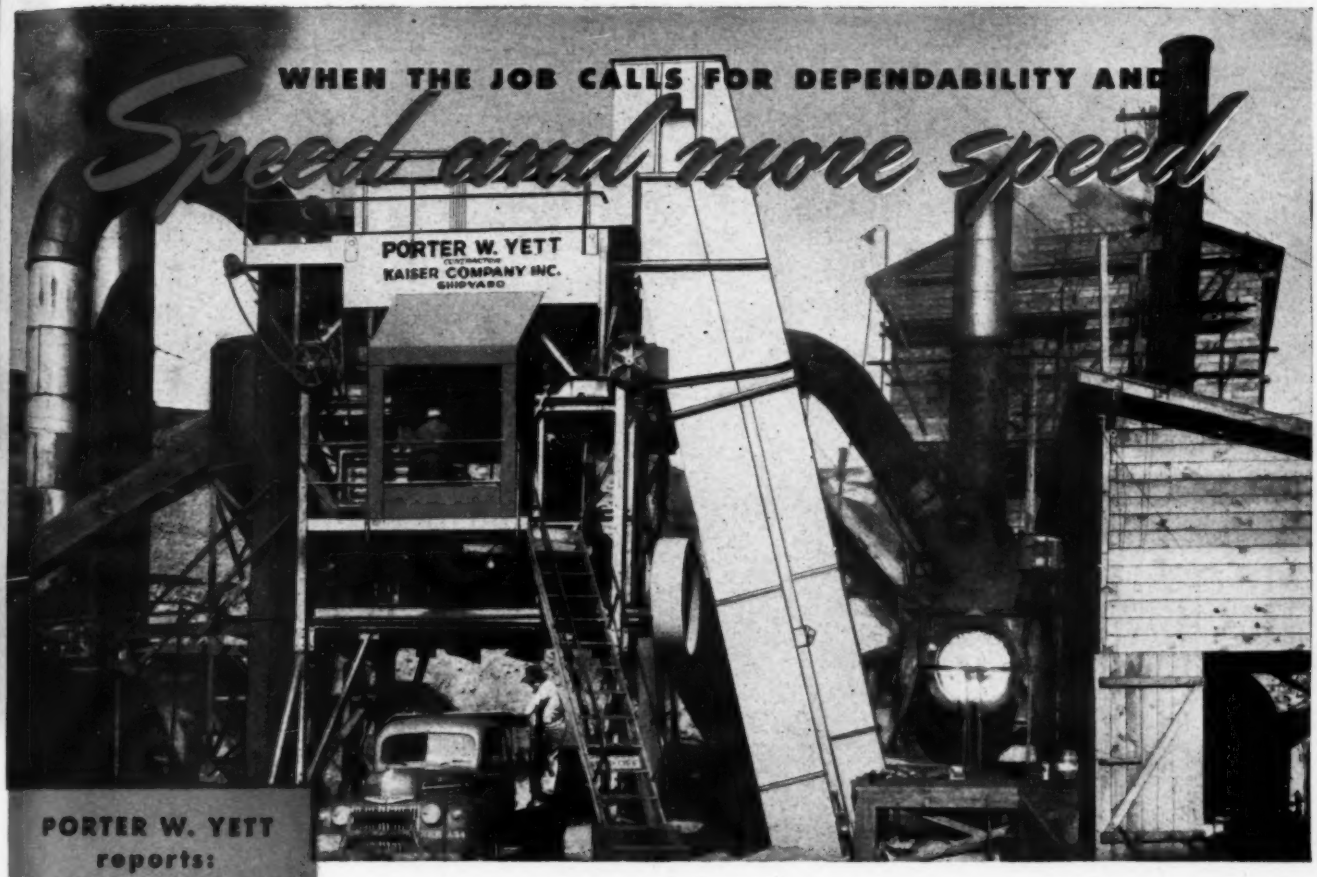
Prime Coat—This is a thin coat of cut-back asphalt spread over the old road surface and the patches that have been brushed clean. When used, it helps to bind the asphalt to the old surface.

Binder Course—An asphalt aggregate mix is delivered hot from the central mixing plant to an asphalt finishing machine and laid from 2 to 3 inches deep over the old road surface and patches.

Wearing Course—This is the top course composed of asphalt, stone, and sand. It is also mixed hot at the central mixing plant and laid by machine. This top course presents a smooth, waterproof, long-wearing surface which requires no seal coat or stone application.

Oil is Ammunition—Use it Wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE



PORTER W. YETT reports:

We are more than satisfied with the operation of our 4000-lb. Madsen Plant. In considering the purchase of a plant to meet our requirements, which was the construction of over 100,000 tons of asphaltic concrete roadways and facilities for three of Henry J. Kaiser Company shipbuilding plants, requiring speed and more speed, continuous operation and dependability. We, after careful consideration, selected Madsen which has more than made good. One of our best production records in one shipbuilding plant was 33,000 tons of 2½-inch asphaltic concrete to Oregon State Highway specifications in 26 light-hour days without one breakdown.

We are glad we bought a Madsen Plant.

...depend upon Madsen

When Porter W. Yett wanted speed and more speed to mix 100,000 tons of asphaltic concrete for the Henry J. Kaiser Company shipyards, he chose a Madsen Asphalt Plant. Why? Because Madsen plants have the pressure-injection system . . . the fast-dumping mixer gate . . . the synchronized plant operations and five other exclusive Madsen-patented features — time-savers that have been developed over a period of twenty-nine years.

On one project, Mr. Yett's plant mixed 33,000 tons in 26 light-hour days *to Oregon State Highway specifications* without a breakdown.

Only tons talk where asphalt plants are concerned — here's what other Madsen Plant owners report:

"It is not unusual to mix in excess of 200 tons per hour with our 3000-lb. Madsen plant."

"We produced 149,121 tons in 8 months with our 3000-lb. Madsen Plant."

"We mixed 75,920 tons from October 1 to December 8 with our 3000-lb. Madsen Plant."

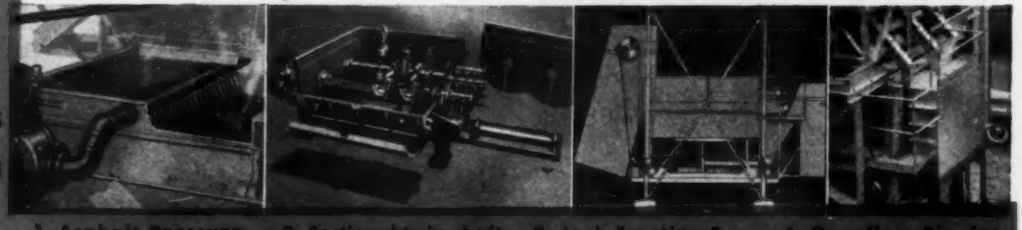
"We have consistently mixed 3500-lb. batches with production reaching 200 tons per hour."

Bona fide letters from which these excerpts were taken are available. Plan for tomorrow today; write for the new Madsen plant catalog — MP-120.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

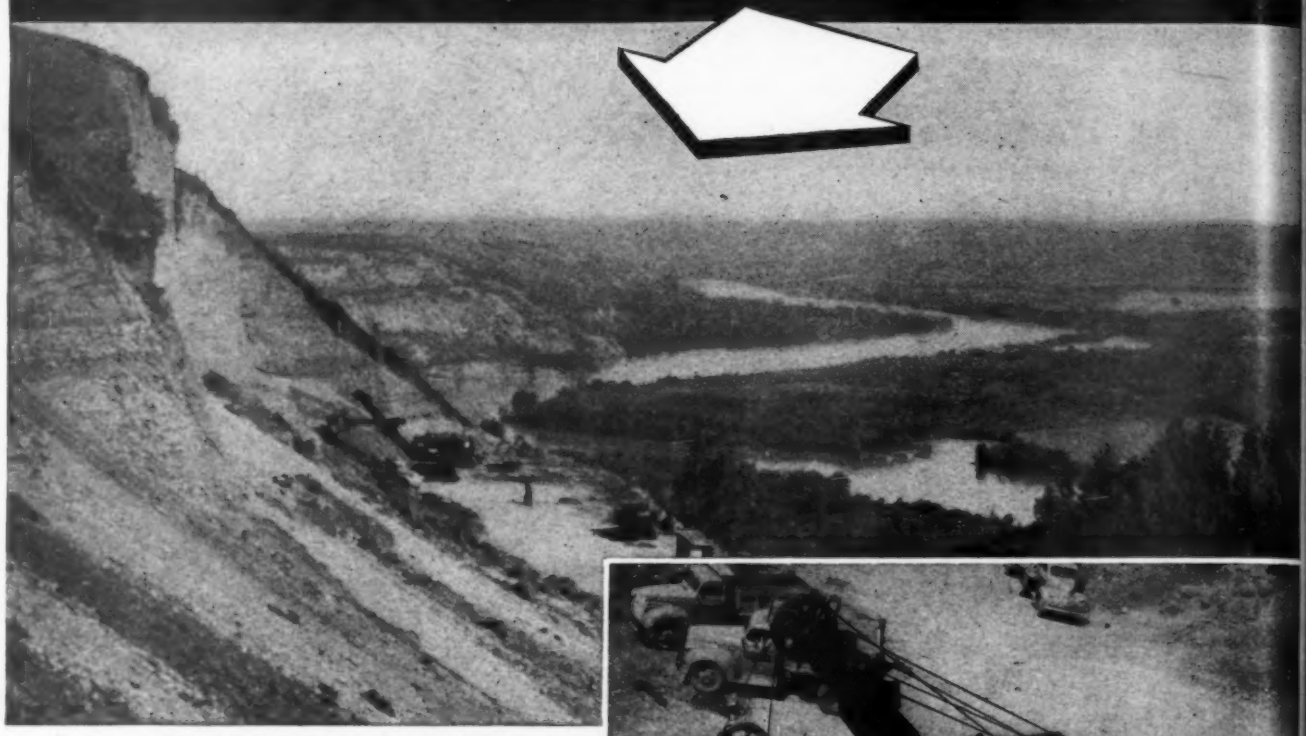
4 REASONS FOR THE SUPERIORITY OF MADSEN ASPHALT PAVING PLANTS

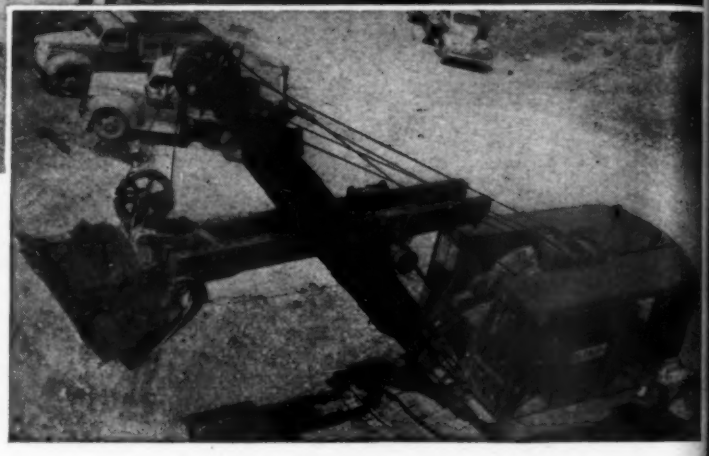
4 EXCLUSIVE FEATURES ON EVERY MADSEN ASPHALT PLANT



1. Asphalt Pressure-Injection System
2. Sectional twin-shaft Pug Mill Mixer
3. Jack-Erection System and power lift
4. Overflow Bin for every truck loading

ON THE ROAD TO VICTORY!





Osgood Shovel No. 2481, Alaska Military Highway

". . . 90,000 yards were hauled from this pit near Ft. St. John, British Columbia. With overburden depths up to 14 feet, less than 5,000 yards were wasted. The greater part of this was cast by the shovel in maintaining and moving ahead on a working level . . ." W. C. Dalton, Federal Works Agency, Fort St. John, B. C.

Wherever there are important rock, soil or sand-moving projects, you'll find OSGOOD performance "clearing the path" to speedier Victory. On the Alaska Military Highway—on all war fronts—Osgood ruggedness, power, free-action (measured air control) provide the *plus factors so* necessary for maintaining war-time job schedules. Osgood's many duties "on the road to Victory" are providing new experience, skills and product developments for post-Victory machines. Investigate Osgood Today . . . to be ready for an earlier start tomorrow!

Preventive maintenance keeps equipment digging in!

Digging deep to buy War Bonds maintains the attack!

The GENERAL EXCAVATOR CO.
Sizes: 3/8 - 1/2 - 5/8 - 3/4
DIESEL - GAS - ELECTRIC
Associated with THE OSGOOD CO.

The HERCULES COMPANY
HERCULES *IRONEROLLERS*
6 to 12 Tons
Diesel or Gasoline
Associated with THE OSGOOD CO.

OSGOOD
Sizes:
1/2 to 2 1/2 Cu. Yd.
Diesel - Oil - Gas - Electric
SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted
THE OSGOOD COMPANY, Marion, Ohio

. . . That *War Birds* may fly sooner

"SOMEWHERE in England"—there are lights shining through the night! There is the rumble of drum gears mixed with the clatter of concrete as it pitches from the drum buckets, a discharge bucket rolls out on the boom and another yard of concrete slithers in a ribbon across the subgrade of a new runway—

Sometimes the alert comes and the lights are doused as the Hun wings overhead.

All over the world MultiFoote Pavers are rolling out wide ribbons of concrete. The dependability of their hour after hour operation and their tremendous output is amazing, even to those who have had experience with MultiFoote pavers before.

Wartime operation has lessons that will influence peacetime profits. MultiFoote postwar owners will secure the benefits of an advance experience, smoother operation, better design and greater output — an advantage that could only come with the study of a *great number of machines on "highball" work.*

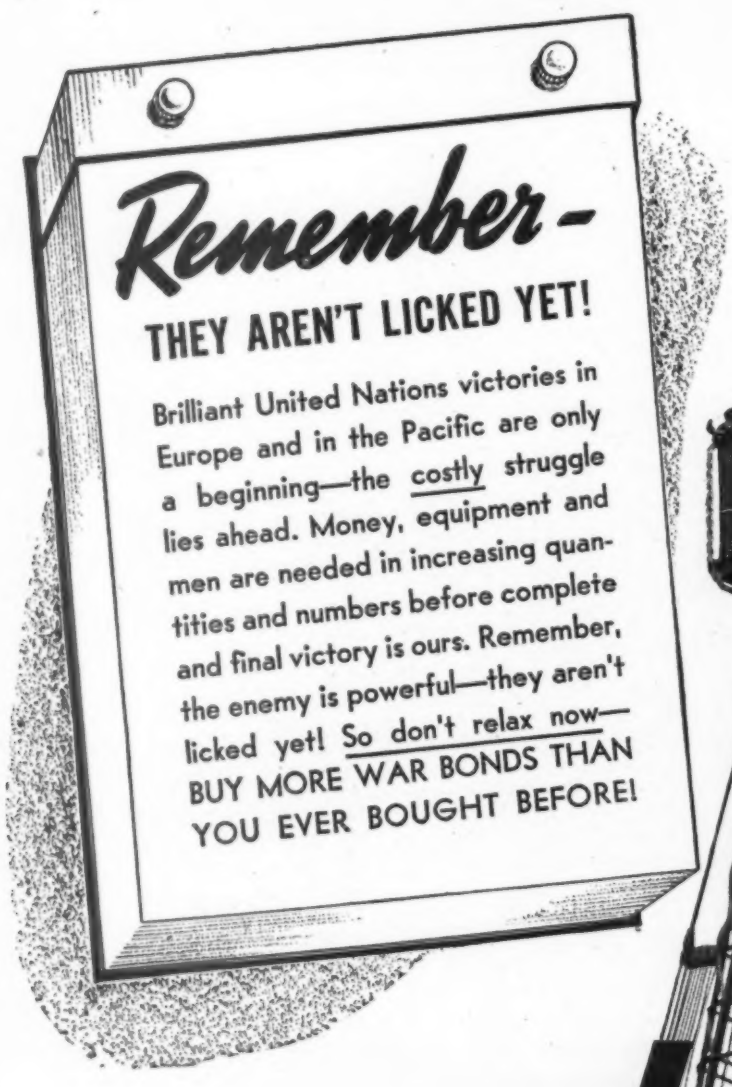
Remember there are more MultiFoote pavers in service than any other make. If we can help you in your future plans, ask for details.

THE FOOTE CO., NUNDA, NEW YORK

For black top pavement ask about the Adnun Black Top Paver. It brings you advantages that no other black top paver can offer.

MULTIFOOTE

CONCRETE PAVERS


Remember -
THEY AREN'T LICKED YET!
Brilliant United Nations victories in Europe and in the Pacific are only a beginning—the costly struggle lies ahead. Money, equipment and men are needed in increasing quantities and numbers before complete and final victory is ours. Remember, the enemy is powerful—they aren't licked yet! So don't relax now—
BUY MORE WAR BONDS THAN YOU EVER BOUGHT BEFORE!

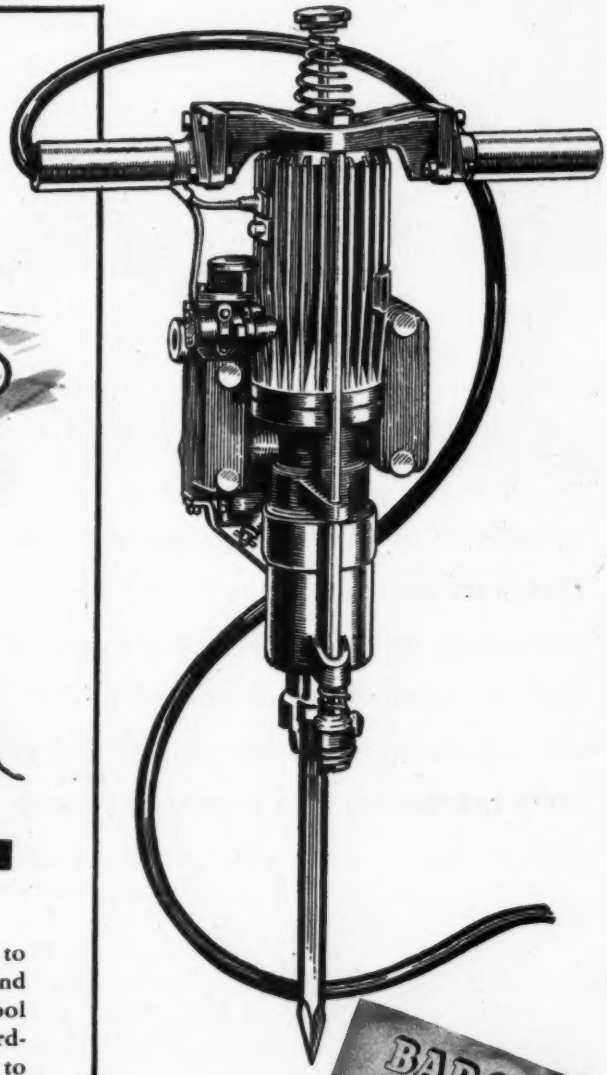
• The test of war is resulting in Michigan Mobile Cranes and Shovels with features more outstanding than ever . . . These new MICHIGANS will help you to greater profits after victory . . . For complete information write for Bulletin E-123.

Write for Bulletin E-123.

AIR CONTROLLED

MICHIGAN
POWER SHOVEL CO.
BENTON HARBOR, MICHIGAN

HOW TO MAKE TOUGH JOBS EASY!



If you have any drilling, digging, breaking, or tamping to do, buy yourself a Barco Portable Gasoline Hammer and watch it make light of heavy jobs. With eleven special tool attachments, every job is made to order for these hard-hitting, steady-working lightweights. They cost little to operate and can be carried everywhere. Better send in the coupon for details. Barco Manufacturing Company, Not Inc.

BARCO

PORTABLE GASOLINE HAMMERS

Light in Weight & Rugged in Construction

BARCO MANUFACTURING CO., NOT INC.
1815 Winnemac Ave., Chicago 40, Ill.

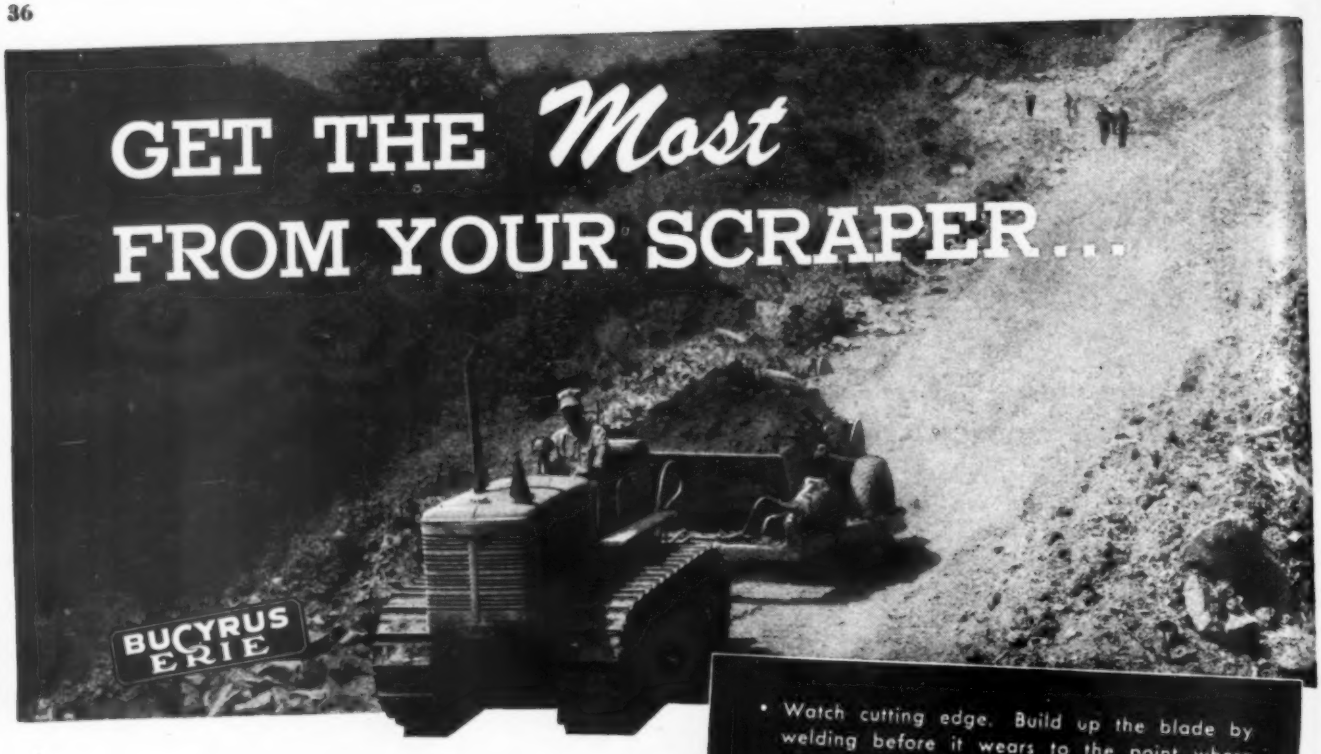
Gentlemen:

Without obligation on my part please send me a copy of the BARCO HAMMER BOOKLET.

Name_____

Street_____

City_____ State_____



GET THE *Most* FROM YOUR SCRAPER...

Your hydraulic scraper is not expendable — keep it in A1 shape. The successful completion of wartime production schedules rests on the ability of your present equipment to stand up to the gruelling task of round the clock operation. Here are some suggestions that may help eliminate breakdown time from your records.

- Watch cutting edge. Build up the blade by welding before it wears to the point where supporting casting is damaged.
- Keep leverage mechanism and pivot pins clean and in proper adjustment for freedom of action in bowl.
- Set apron opening at correct position for the type of soil which is being loaded.
- Make certain that same adjustment of bowl stop is used on both left and right sides to avoid twisting of bowl.
- Check condition of draw-bar pin and safety cable.
- Hydraulic system check-up should be regular routine. Make certain that oil is up to level and system is clear of air.
- Drain the oil when it is dirty. Floating particles wear the pump and valve.
- Keep all hose and pipe connections tight to prevent loss of oil and infiltration of air.
- Have an adequate schedule for lubricating at high-pressure fittings.
- See that all nuts, bolts and cotter pins are in place and tight. Keep tires properly inflated.

Bucyrus-Erie 2-wheel scrapers are built to withstand the grind of triple-shift performance, but even they must have proper maintenance for capacity production over long periods of time. Your International TracTracTor distributor will gladly advise you on proper maintenance and lubrication.

F145

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

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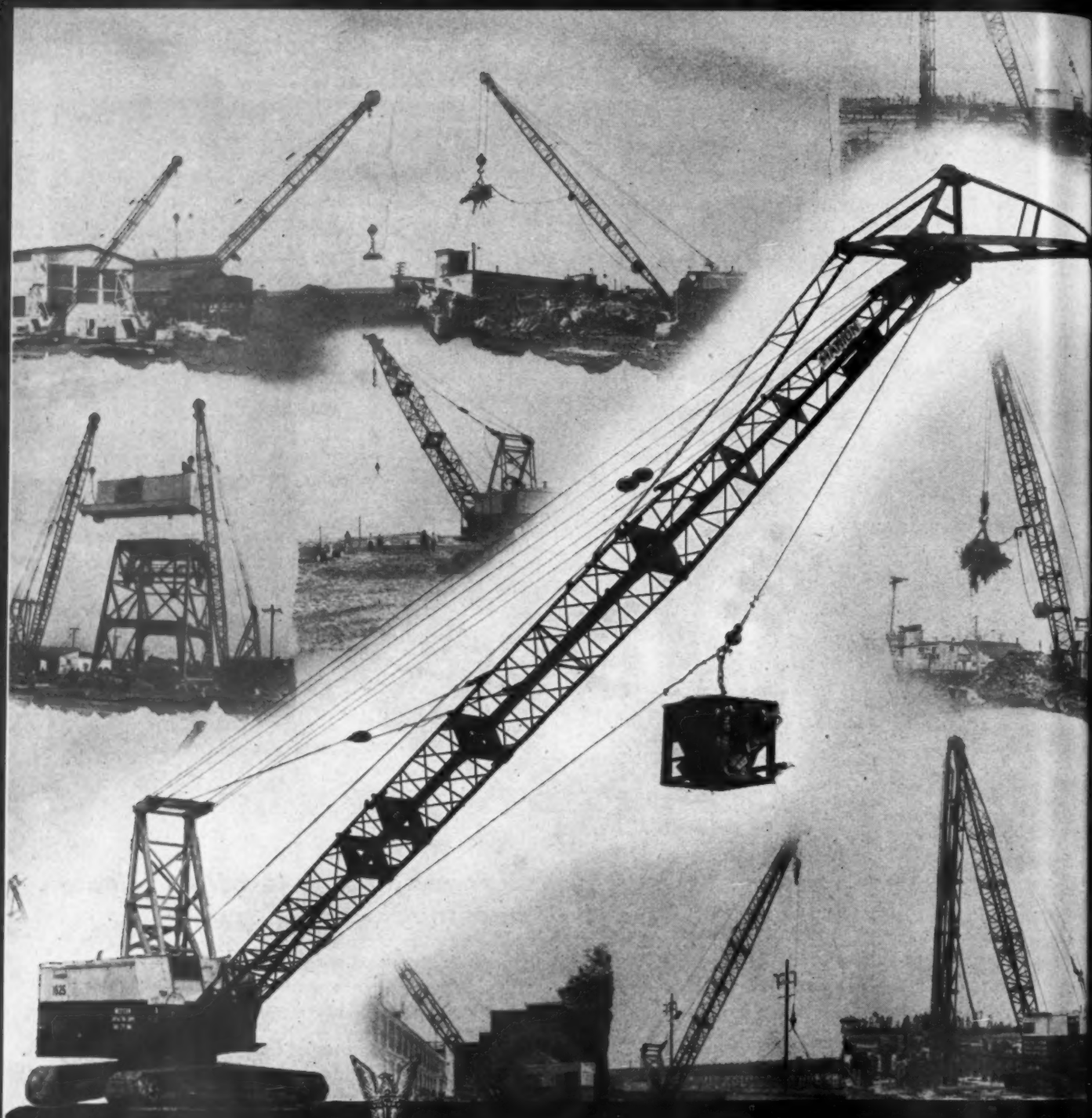

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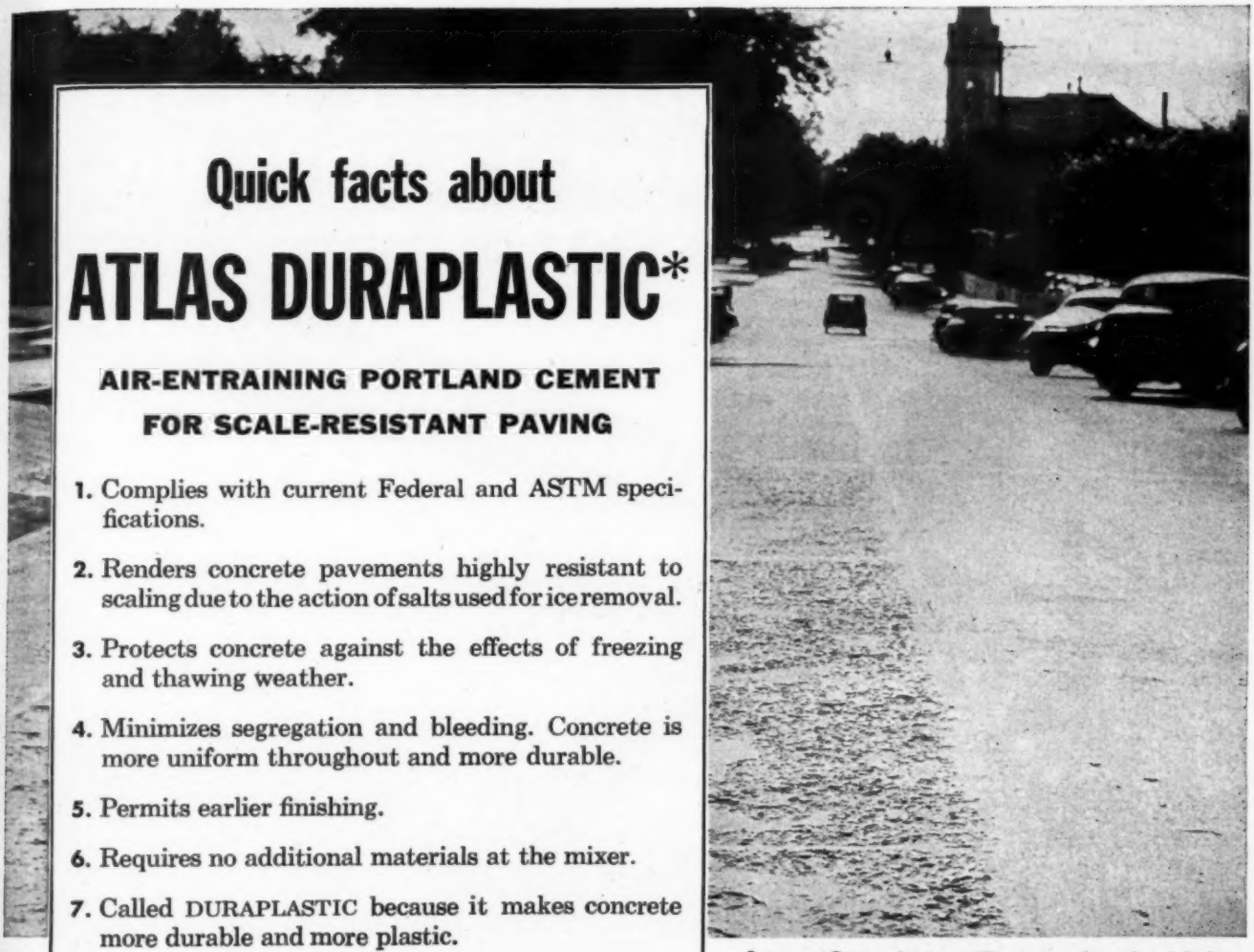

Quick facts about

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AIR-ENTRAINING PORTLAND CEMENT FOR SCALE-RESISTANT PAVING

1. Complies with current Federal and ASTM specifications.
2. Renders concrete pavements highly resistant to scaling due to the action of salts used for ice removal.
3. Protects concrete against the effects of freezing and thawing weather.
4. Minimizes segregation and bleeding. Concrete is more uniform throughout and more durable.
5. Permits earlier finishing.
6. Requires no additional materials at the mixer.
7. Called DURAPLASTIC because it makes concrete more durable and more plastic.

Lawrence Street, Appleton, Wisconsin, where the right lane was laid with Atlas DURAPLASTIC in July, 1940, at the same time normal portland cement was used for the left lane. Photo taken in 1943 shows the results of three winters of identical salt de-icing treatment.

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Engineering News-Record 10/10/40—Article on original research and test road.

Roads and Streets Nov. 1943—Article on DURAPLASTIC pavements in Milwaukee, Appleton and Chicago.

Engineering News-Record 12/30/43—Article on DURAPLASTIC pavements in Minneapolis after four winters of de-icing treatment.

Our Technical Service Bureau will furnish detailed information on the use of Atlas DURAPLASTIC—the cement that makes concrete scale-resistant. Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

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ROADS AND STREETS

February, 1944, Vol. 87, No. 2

Philadelphia Industrial Highway

Eleven contracts for 14 miles of heavy-duty divided roadway completed by state in 1943; work ties in with state's $43,000,000 post-war highway development program for Philadelphia

TEN well-known contracting firms made fast time this past autumn on Philadelphia's new industrial highway, under construction since late 1942 and early in 1943. Of post-war as well as immediate importance in the Philadelphia scheme, this development will eventually provide a fast, direct bypass truckway from the suburb of Chester to Vine Street, near the Philadelphia-Camden bridge. Philadelphia has long needed the road, as evidenced by legislative action dating back twenty years.

Largely following the line of existing roadways, the recent improvements begin at the suburb of Eddystone, follow Essington Avenue several miles along the Delaware River, and comprise other segments on northeastward, as shown in Fig. 1 and Fig. 2.

After the war, when a high level bridge can be built across the Schuylkill, the route will more directly cross this stream via Penrose Ferry Road and Penrose Avenue. (See section 3 on accompanying map.) For now, however, traffic will detour along Essington and Passyunk to Broad Street, and some traffic will turn south on Vare Avenue and then to Oregon to get to Broad.

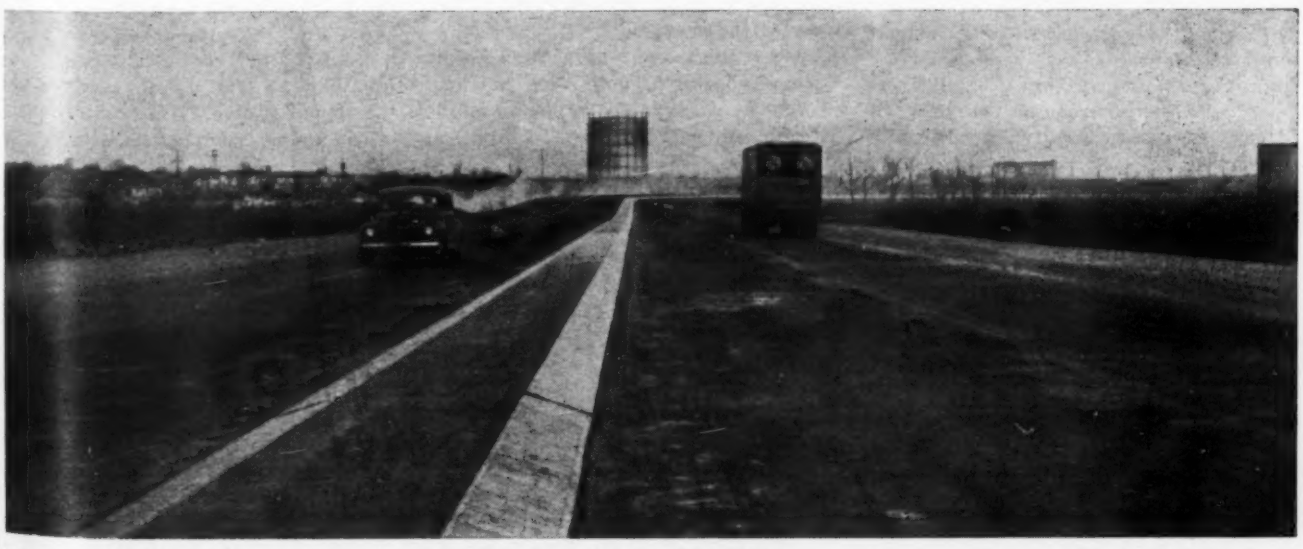
Recent contracts also included a short link (Island Avenue) in a future connection north into the city; the 26th Street access road to League Island Navy Yard; and Penrose and Moyamensing Avenue connections.

About half the improvement mileage lies within the city limits, the most easterly coming within 34 blocks of the downtown city hall. With post-war construction planned for a 4½-mile elevated extension along Delaware Avenue to downtown Vine Street (project 17) the ultimate importance of this highway to the city can readily be seen.

Meanwhile the newly completed sections have begun to carry traffic from adjacent war-industry plants, the Navy Yard and the municipal airport. The highway will spur development of the extensive industrial area it traverses, this area lying in the only direction left for Philadelphia to expand after the war.

Features of Roadway Design

The design in general consists of two 24-ft. or 36-ft. divided roadways, with standby or turnout lanes at major intersections and plant entrances. Provision is for ultimately widening all urban sections to six lanes. Except for a small amount of bituminous macadam on one contract



Tracks are now using the Essington Avenue section of the Philadelphia Industrial Highway, which will speed across to the downtown area

On Francis A. Canuso's 3-mile contract. Spreader and finisher hugged close behind the 34-E dual (Vinsol-Resin concrete has very little surface moisture when freshly spread)

J. H. Stormfeltz, district construction engineer, and W. R. Eccles, assistant construction engineer on the Philly job

D. C. Stackpole, district engineer, Pennsylvania division of highways, Ardmore, with W. E. Bailey, assistant district engineer, and W. H. Herman, division engineer

all pavement is concrete. The center dividing strip is from 4 to 6 ft. wide, with 15-in. sloping white-cement reflector curbs. The prevailing cross-section includes 10-ft. rural-type shoulders and embankment slopes. Through one suburban village the roadways spread out for two miles and follow parallel street rights-of-way.

Concrete Slab Design

All concrete pavement is of 10-in. uniform thickness, except that along one section where a 9-in. slab on 9 in. of crushed aggregate insulation (two lifts) plus screening course was deemed necessary because of soil conditions.

While perhaps half of the new work passes through low river marsh, generally satisfactory subgrade was obtained either from roadside borrow or run-of-bank slag from nearby industrial plants. The 10-in. pavement depth therefore was considered necessary, not so much because of poor subgrade support, but because of the heavy industrial hauling expected. The legal maximum axle load in Pennsylvania has been lifted from 18,000 to 20,000 lb. since the war, and may never be entirely reduced. This fact, together with the high incidence of very large trucks and the prevalence of pumping joints observed on overloaded concrete pavements of all ages over the state since the war, made the heavy design advisable.

Each 24-ft. pavement is divided for one-lane placement by a keyed longitudinal center joint doweled with ½-in. bars at 5-ft. ctrs. Transverse ¾-in. premolded expansion joints are spaced 120 ft., and dummy contraction joints at 20-ft. intervals. Slip dowel load-transfer units are employed at expansion joints. Wire mesh up to 63 lb. was used on some, but not all, contracts—various types of mesh or none, depending on availability.

Vinsol Resin Concrete

Air entraining portland cement was employed on all work. The concrete mix (about 1-1.7-3.75) included 2¼-in. max. gravel, 40% or more crushed. Concrete of maximum density was obtained by combining 2A and 2B graded gravel (2¼ and 1 in. max.) to get the desired grading.

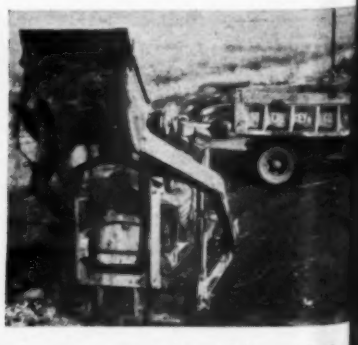
Pavement drainage is provided by sloping each roadway from 1¼ to 1¾ in. to the outer edge, and by adoption of 0.3% minimum centerline grade, regardless of flatness of the ground profile. No grade of more than 1.0% was required on any of the projects for topographical reasons and adherence to the 0.3% often necessitated laying out the new roadway on an undulating profile, the high and low limits of which were controlled by future sewer gradients and fill-in or catch-basin ground elevations established under the city's master drainage and sewer plan. Eventually it is expected that the entire area will be raised ten feet or more. Much of the urban portion of the new roadway is built 10 to 14 feet above the present marshy ground; rural sections, 4 to 6 ft. above.

Extensive Subdrainage

In addition to rural-type concrete pipe culverts, a storm drain was installed along one section. Subdrains of perforated bell-and-spigot vitrified tile were added where capillary conditions dictated. Used along perhaps six miles of roadway, drains consisted of the usual pavement-edge lines with herringbone laterals. Drains were placed 15 to 30 in. below the subgrade and stone-backfilled just ahead of final subgrade rolling.

Notes on Construction

An exceptionally dry season (121 days without rain) aided the contractors, and in spite of war shortages exceptionally good equipment was available. The eleven paving jobs employed twelve 27-E or 34-E duals. Grade was compacted with 10-ton



Although cool Autumn weather prevailed, Canuso's men permitted no delay with the asphalt curing spray. Grading equipment included this handy over-head loader, which cut back an embankment by loading trucks from the bottom of the slope

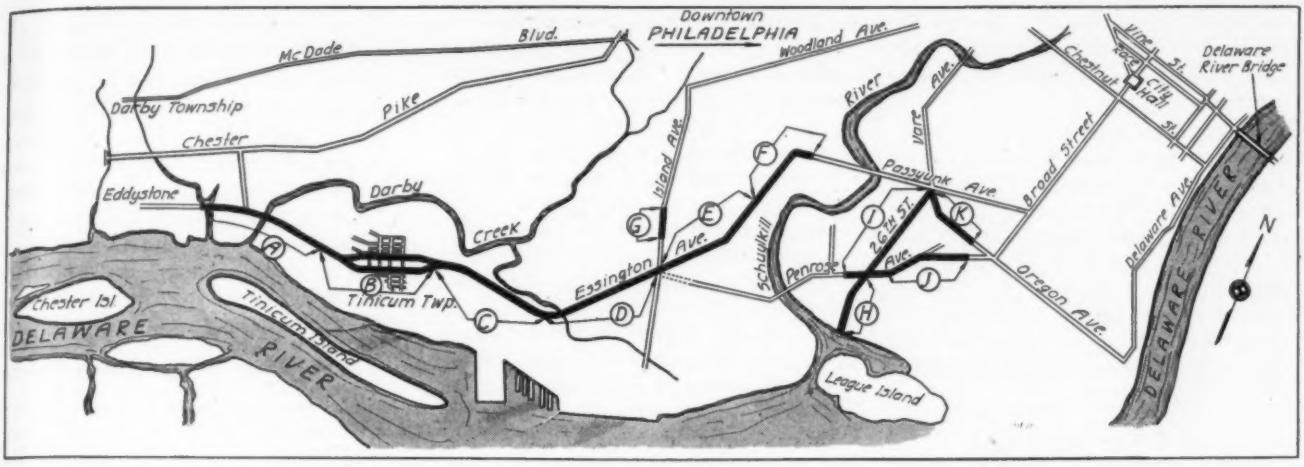


Fig. 1. Summary of 1942-1943 contracts, Philadelphia Industrial Highway and connecting projects. Cost: $4,400,000

(A) 1.4 miles by Cayuga Construction Co., New York City, at $1,016,602. Paving subcontractor, Hastings Pavement Co., N. Y.

(B) 2.99 miles, Francis A. Canuso, Philadelphia, at $376,350

(C) 1.4 miles by Seaboard Construction Co., Philadelphia, at $328,452

(D) 1.5 miles Fred Berlanti & Sons, Inc., Harrison, New York, at $500,810

(E) 1.3 miles, F. Feraco, Buckleye Company, Inc., and Union Paving Company of Philadelphia, at $417,673

(F) 1.3 miles, Louis Dolente & Sons, Philadelphia (grading), and Seaboard Construction Company (paving), at $196,028 and $168,603, respectively

(G) Island Avenue, 0.4 miles (6-lane divided), Frank R. Curtis, Philadelphia, for $120,292

(H) Access Road to Philadelphia Navy Yard, 0.6 miles, including bridge under the Pennsylvania railroad tracks, for $277,757, Acchione Construction Co., Philadelphia

(I) Penrose Ave. and 26th St., adjacent to foregoing section, 1.5 miles (4 and 6 lane), Fred Berlanti for $356,383

(J) Penrose and Moyamensing Aves., 0.9 miles (6-lane divided), Berlanti Construction Co., for $326,655

(K) Vare and Oregon Aves., 0.8 miles (6-lane), Frank R. Curtis, for $301,575

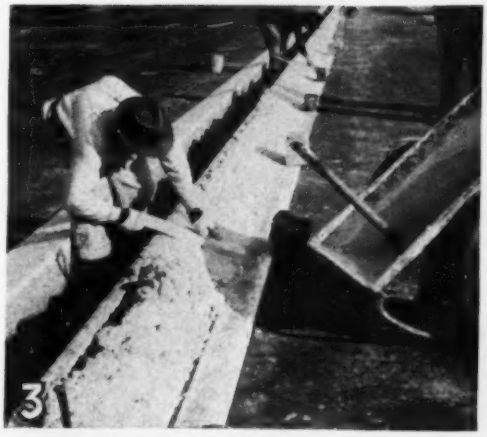
* * *

Steps in Placement of White-Cement Reflecting-plane Curb, Canuso Contract

* * *

three-wheel rollers. All fills were rolled in 4-in. lifts, instead of the usual 8 in. Subgrade acceptance was based on visual inspection.

Concrete was finished with a minimum of manipulation. Because of the use of Vinsol Resin cement, which tends to hold water in the mix and minimize surface moisture, the spreader and finisher on all work hugged along immediately behind the paver, and belting followed within another few feet even in cool weather. The men back of the paver at first had minor difficulties getting used to the slightly different characteristics of Vinsol concrete, but after a few hours, balling under the belt was eliminated and the finishers "went



(1) Forms set and sloping earth base being tamped
(2) Before placing white-cement mortar
(3) Spreading the topping mix
(4) Hand method of forming reflecting planes
(5) Edging trowel completes the job
(6) Wet muslin cloth protected the curb through the first day

sailing." Burlap belt or drag was followed by asphalt membrane curing. Modern steel forms were used throughout.

Preliminary to casting the white cement reflecting-plane curbs, earth was tamped between the forms to the slope required by the curb cross-section. Then low-slump concrete from a one-sack mixer was placed and tamped, and 1 in. of white cement mortar placed, struck off, fluted, protected against discoloration the first day with a moist white cloth; then cured under paper.

Rotary Intersection

Calling for some nice hand "noodling" by the finishers, and the solution of several interesting design problems, a rotary intersection was built at the junction of Essington and Island Avenues. Here a 2-lane local street also converges, and future entry of an extension of Penrose Avenue is planned (project 9 in Fig. 2). Present construction includes two 13-ft. outer and two 12-ft. inner lanes around the circle, with 4-lane pavements entering from four directions and two lanes from a fifth. The inner radius is 150 ft. Radii of channelized entry lanes vary from 121 to 166 ft. Intersection pavement is crowned and surface drainage collected at both inner and outer edges. The center circular area is to be top-soiled.

Construction of this intersection also required burying a creek with concrete pipe lines. Double electrical ducts, controlled from a box at the center of the circle were installed for present and future traffic signalization. Since this intersection is practically adjacent to the Philadelphia municipal airport (now under army control) it can easily become a busy "business corner" some day, and problems of future lighting and of vehicle and pedestrian control had to be considered in working out the initial improvement.

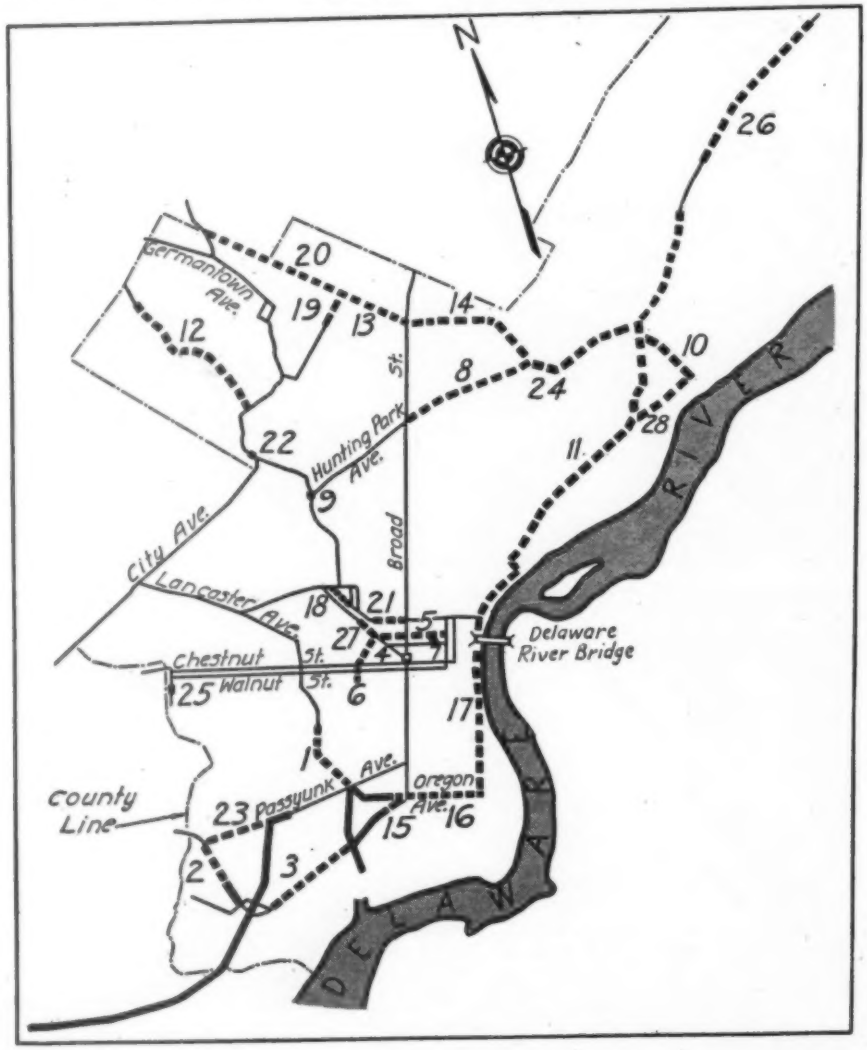


Fig. 2. Some of the state's more important post-war projects for Philadelphia include the following, the numbers being merely for map reference and not indicating any order of priority. Solid lines indicate completed Industrial Highway and connections

(1) Vare Ave. and 34th St., from Passyunk Ave. to Grays Ferry Rd., $700,000.
(2) Island Ave., from Buist Ave. to Eastwick Ave., $180,000.
(8) Roosevelt Blvd., from Broad St. to Oxford Circle (inside traffic lanes), and the widening of five bridges on route, $2,100,000.
(9) Grade separation at Hunting Park and Ridge Ave., $600,000.
(10) Levick St., from Roosevelt Blvd. to State Road, $1,000,000.
(12) Henry Ave., from Walnut Lane to Ridge Ave., $1,500,000.
(13) Stenton Ave., from Washington Lane to intersection with Broad St., at Godfrey Ave., $250,000.
(14) Godfrey and Adams Aves. from Broad to Roosevelt Blvd., $800,000.
(18) Extension of Pennsylvania Ave., covering tracks of B. & O. and Reading railroads from Olive St., $2,750,000.
(24) Roosevelt Blvd. from Broad St. to Pennypack Circle (outside lanes), $2,500,000.
(26) Roosevelt Blvd., from Grant Ave. to Philadelphia-Bucks county line, $1,000,000.
(27) Benjamin Franklin Parkway, from Spring Garden St. to 20th and Vine Sts., $500,000.

Darby Creek Bridge Taxed Pumps

Cayuga Company's 1.4-mile contract at the west end involved placement of extensive run-of-bank slag roadway fill across the marsh around Darby Creek. Interest on this job, however, centered around the creek bridge. Consisting of two 48-ft., two 71-ft. and one 65-ft. I-beam spans with concrete deck, supported on open-type concrete piers, this 4-lane structure presented below-water difficulties. Over 55,000 cu. yd. of material, consisting of blue gumbo mud and a lower strata of sand and gravel, was dredged out of the stream bottom and sides, using a circular cutter. Material was wasted through an 18-in. line over an area 2,000 ft. away. The space dredged was backfilled with bank slag, slag filling being continued to an elevation several feet above high tide and rolled in 8-in. layers. Slag was dumped by trucks to underwater positions, bulldozed at higher levels. Actually this filling merged with that of the approach embankments, which required a total of 162,000 cu. yd. Slag was trucked from a 3-panel unloading trestle built under a nearby railway embankment.

A total of 24,750 lin. ft. of steel-nosed piling was required. Steel sheeting for four pier cofferdams, each 16 x 82 ft., was carried 18 ft. below footings, or about 45 ft. below water. Pier construction necessitated placing a 5-ft. concrete seal in addition to the concrete footings—and still blowing occurred. On several occasions a diver was employed to locate blows and direct dispersion of accumulated sand. After leaks were plugged, a 4-in. line supplied by two compressors was used to force sand out into the river through a 6-in. pipe. Seal and foot-

ing concrete was tremied and the cofferdam then de-watered to minus 28 ft. by a hook-up of five 5-in. and 10-in. pumps.

Cayuga Construction Co. subcontracted paving to Hastings Paving Co., New York City; dredging to Delaware Dredging Co., Wilmington, Del., and piling work to Kelly Pile and Foundation Co., New York. The Kelly firm used three steam cranes on barges to drive sheeting and piling. This equipment also erected the center span piers.

Post-War Philadelphia

The Pennsylvania Division of Highways, in conjunction with Philadelphia city authorities, has crystallized a master plan of 28 post-war traffic relief projects, aimed at elimination of all serious bottlenecks. The largest (*No.* 17 *on map*) is a 4-lane elevated highway extending along Delaware Avenue for four miles to the lower downtown area, to cost an estimated $9,000,000. Other larger projects include a $4,000,000 connecting link to Roosevelt Blvd. (*No.* 11); completion of new approach Delaware River Bridge, with $4,000,000 cost plus $3,300,000 for right of way (*Nos.* 4-5-6-7); and a 6-lane $4,500,000 improvement (*No.* 3).

While in general the improvements will follow the lines of existing streets, there will be adherence to the highest standards of arterial design. Divided roadways will be standard with limited access where feasible.

Preliminary engineering work on many of the projects has been completed, and surveys and studies are being pushed on others as rapidly as the shortage of engineers permits. Right of way acquisition of course is a major part of the task.

For the Delaware Avenue elevated road (*No.* 17) elevated design is the only practicable solution, since the location, paralleling the water front as it does, cuts across numerous rail lines and local roadways leading to docks, terminals and warehouses.

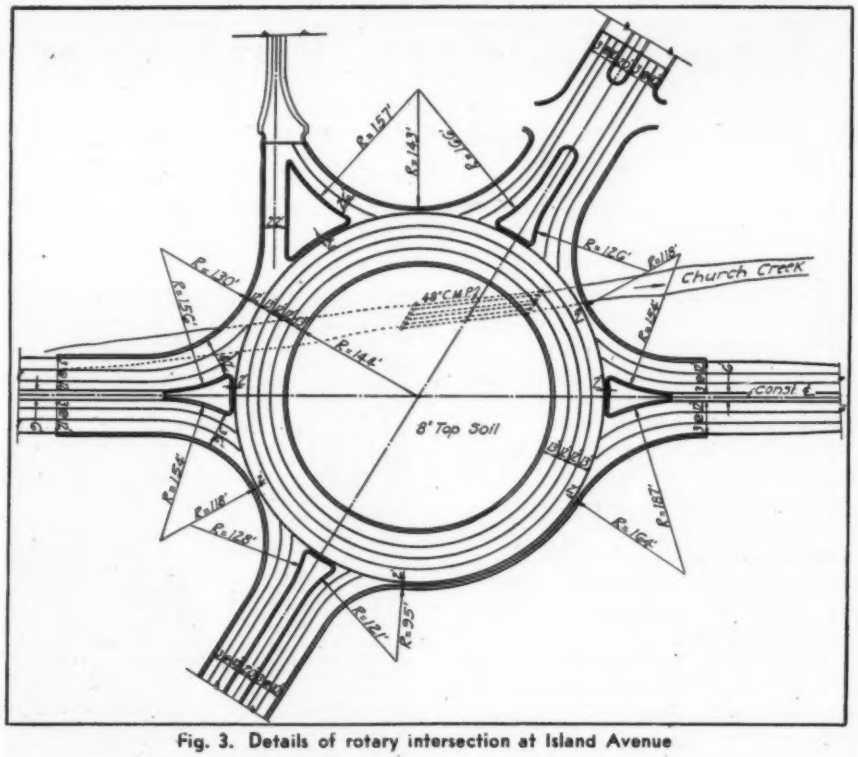
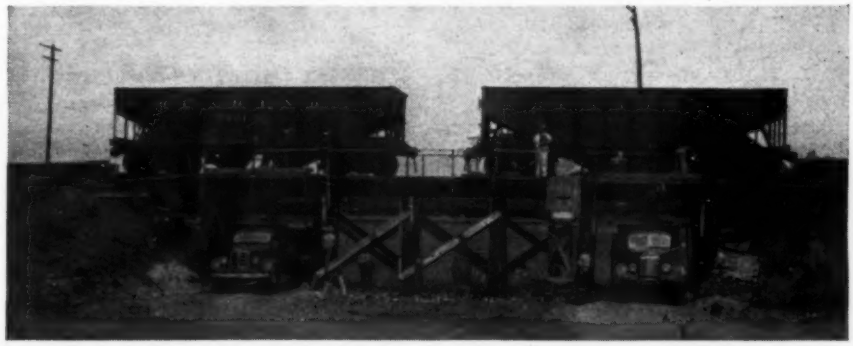


Fig. 3. Details of rotary intersection at Island Avenue



A loading trestle expedited delivery of slag for filling (Photo by W. R. Eccles of Pennsy. highway department)

Extensions at the southern end of the elevated structure will include channelization of existing Oregon Avenue from Swanson to 18th St., at a cost of $150,000 (*No.* 16).

Improvements on the Delaware bridge approach, originally planned for starting in 1943, have been placed on the post-war list, and the state and city have made good progress in acquiring property along downtown Vine Street in readiness for early clearing. There will be eight traffic lanes (divided) from 6th and Vine to 15th St., and five lanes divided on to the Benjamin Franklin Parkway.

On Cayuga's Darby Creek Tidewater bridge job. Slag for approach embankments was spread and rolled in 8-in. layers. Floating crane in background is handling center-pier sheeting from midstream

Showing center-pier cofferdam, floating walkway, and dumping of slag to stabilize channel cross-section and build up approach embankment

Road Builders' Post-War Conference

One of most fruitful road conventions in years devoted to after-war planning, financing and legislation, the surplus equipment ogre, advantages of contract system and other vital topics

WE'VE remarked before in these columns that it took the crisis of a war to boost *advance planning* to the front as the greatest single consideration in highway engineering and construction.

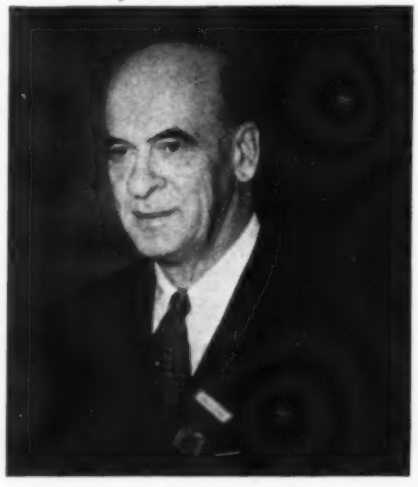
That fact was more in evidence than ever at the American Road Builders' Association annual meeting, Feb. 1, 2 and 3 in Chicago. The thousand men who attended heard gratifying reports of progress on pending post-war road legislation. They reflected a growing unity of beliefs as to how future federal funds should be apportioned between the states and between local, arterial, urban and inter-regional highways. They were given a fresh picture of the serious highway traffic problems and road conditions the nation will face after the war.

But post-war matters almost got shoved out of the spotlight by another giant of a problem: surplus war construction equipment (if any) and how it should be disposed of with least disruption to business and greatest benefits to road-building.

The program included such notable speakers as Paul Hoffman, president of Studebaker Corp. and chairman, Committee on Economic Development; Congressmen J. W. Robinson, Jennings Randolph, J. H. McGregor, Karl Steffan, Alfred J. Elliott, James W. Mott, and Jesse Wolcott; Senator John L. McClellan; Harold D. Smith, Director of the Budget; J. F. Lincoln, Lincoln Electric Co., Cleveland.

Pres. Brown Urged Greater Vision, More Local Self Reliance

In his annual message, president C. W. Brown reviewed the highway industry's praiseworthy war effort, then turned to the hard days ahead. While some states have had to cut road maintenance budgets little, if any, others have been forced to reduce 30 to 60%, in the face of accelerated wear on arterial surfaces. Sharp curtailment of new road construction from $1,100,000,000 in '40 to $350,000,000 in '43 and $220,000,000 estimated in '44, or far below normal replacement, is further adding to the seriousness of the road situation. Roads that normally would serve another five to ten years will have to be rebuilt immediately after the war, and any post-war program advanced must make up for lost time.



Carl W. Brown, re-elected pres. of ARBA

President Brown reported formation of an Assn. public relations committee, with publicity program reaching into smaller communities. He called on road-builders to "use all the visionary powers we possess in designing for the needs of the future," and to give attention to both rural and urban problems.

Biggest immediate problem is the speeding of enabling legislation. "However, we mustn't put too much stress on help from Uncle Sam," he warned, "but should look to our local resources first." Post-war reserves aided by curtailment, are being built up by numerous agencies in spite of reduced revenues.

ARBA has a joint legislative committee with AASHO and is cooperating with all agencies on future highway development. The recent inter-regional highway committee report to President Roosevelt will undoubtedly influence national post-war road plans, foresees Mr. Brown. Also pending is the Stewart Bill on federal aid to counties. Highway hearings will start Feb. 29 in Washington.

Post-War "Shelf" Lagging, Warns Carey

Col. Wm. N. Carey, chief engineer of Federal Works Agency, on "Planning for Post-War Construction," emphasized that as yet there is no overall national program of public works. Only the highway phase is taking form. A shelf of ready public work is non-existent today, the war having halted planning and blueprinting on a national scale. Then, too, many so-called local post-war programs are merely lists of projects with "horseback" estimates. No centralized government agency has been authorized even to collect such lists.

New York City is a notable exception to the lag in planning, but even this energetic city has plans ready on only 15% of its proposed work. It does have $20,000,000 for going ahead, however.

"No city has a real post-war program," said Col. Carey, "unless it is now acquiring rights of way, making surveys and drawing plans." The big drawback isn't lack of money but the attitude of waiting to see what Congress will do. In stating that Congress should soon declare itself, Col. Carey warned that outright grants are not likely but that federal assistance on plans preparation in the form of loans is possibly in sight.

Local officials meantime feel that they can't afford to take political risk by spending local funds for engineering work which the federal "gravy train" would later finance.

The term "needed public works" was clarified as being improvements which a community needs so urgently that it is willing to finance themselves if necessary. Long-range municipal "face lifting" projects such as super-super highways are fine, but it is important to confine aim first at practical, immediate works.

Samuel C. Hadden, Indiana, speaking as president of the AASHO, outlined 1944 state highway department activities. The trick this year, he reminds, is to "stay on top of the log"—keep as many employes together as possible, do the minimum necessary road fixing and get ready for the big days to come. As an example of the greatly increased maintenance required, state's arterial maintenance will cost $45,000,000 this year. He gave an all-out endorsement of the effectiveness of contract performance of maintenance and repair work, saying that in Indiana some patching, surface treatment and bridge painting as well as resurfacing will be let if contractors (and materials) are forthcoming. Linseed oil is the critical ingredient in painting work.

[*See editorial, page 70, for data and comments on the contract-vs.-force account question as discussed at the ARBA meeting.*]

Mr. Hadden expressed hope that highway officials would soon be permitted to go ahead with maintenance and repairs without getting war department OK on individual projects. He characterized the present L-41 red tape as deplorable. Some small construction work, limited in cost per mile or per job, is also a hope.

Simple Jobs Take Little Blue-Printing

One of the most important utterances of the entire convention was Mr. Hadden's reminder that a very large volume of post-war work can be planned without having to fill empty drafting stools or undertaking difficult plans. On widening of pavement, for example, he said, "Nothing we've done has been more popular than widening 18-ft. roads to 20, 22 or 24 ft.

"Where the existing alignment and profile are reasonably good the contractor can go ahead without detailed plans, often using profile and drainage sheets from the original pavement, with a few details sketched on. Widening costs about $6,000 a mile, and Indiana has 2,000 miles of roads that need immediate widening. The same idea holds for resurfacing, which involves little blue-printing. Much of this useful and popular work could be launched in the post-war interim while more elaborate projects are being drawn up."

Keep Utility Benefits in Mind

H. E. Hilts, deputy commissioner, Public Roads Administration, in paper, "Traffic Needs and Post-War Highway Planning," characterized planning as a *continuing* function. Right now all agencies are interested in the last of the prewar studies which culminated in the state-wide plannings surveys. These data afford a sound engineering basis for planning future traffic needs.

We are now passing through a period which tests the ability of all projects to pay their way, and prudence dictates a reasonably economic approach to financing post-war work. Any new roads planned should be largely self-supporting, or if subsidized show other definite utility benefits (as with farm feeders). Mr. Hilts believes, too, that federal aid should be continued on a substantially equal federal-local partnership basis, as in the past.

Mr. Hilts forecasted a drop to 28,400,000 vehicle registration in 1944 (17.6% under 1941), of which 4,400,000 will be trucks. Motor imposts have dropped from peak of $1,552,000,000 in 1941 to $1,161,000,000 in 1943 (down 26.9%), and 1944 revenues are guessed at $930,000,000,000. Although the auto industry counts on making five million new vehicles the first re-conversion year, including a million trucks, it should take 3 to 5 years for motor registration to equal its pre-war peak.

In a post-war program there likely will be three national classes of highways—inter-regional, federal-aid primary and secondary, and local. The federal-aid primary roads, while comprising only 7.59% of the nation's mileage, carry 57.1% of the rural traffic, this figure varying up to 68.3% in individual states (figures based on 25 states). The projected F.A. secondary system, another 10% of the mileage, carries about 27% of the traffic. Thus the combined F.A. network concentrates 84% of all rural traffic movement on 17.6% of the roads. These figures are vitally important in planning apportionment of funds, but the land-use value of lightly traveled local roads must also be weighed.

Many Local Roads Can Be Closed

Thirty-two states have now submitted selections of routes for secondary F.A. systems.

A study of low-volume roads reveals that many are a financial liability for which there is no justification, and that many counties can cut down the mileage on their county systems.

For example in Colorado, where the state highway department has cooperated actively with land-use planning groups and local governments, one county closed nearly a thousand miles of road without hardship to ranchers or farmers, and reverted 1,200 miles to private ownership. And in one midwestern farm state a study showed it feasible to close one-fifth of the rural grid-iron mileage and still serve every farm directly.

What to Do With Post-War Surplus Equipment!

Peak of interest was reached in the session devoted to the post-war disposal of surplus construction equipment. With Claude Heacock of Caterpillar Tractor Co. presiding, round-table speakers succeeded in refining somewhat the conclusions advanced at the Associated Equipment Distributors' January meeting.

As in the AED meeting, Lt. Col. E. R. Needles, speaking for the Chief of Engineers, took the optimistic view that there would be no serious surplus problem, while various manufacturers' representatives disagreed. Hal Sours, Ohio, read an important prepared statement on the problem (see page 48).

A. E. O'Brien, managing director, Highway Contractors' Div., brought the matter to the clearest recommendations yet, the following being the sentiment of a Division meeting and incidentally tallying closely with recommendations passed by state highway equipment and maintenance engineers a few days before at the Mississippi Valley conference, Chicago:

Mr. O'Brien's three points are:

1. Whatever the disposal method

Some of the Headliners at the Recent A.R.B.A. Meeting

R. G. LeTourneau, of R. G. LeTourneau

Lt. Col. E. R. Needles, Chief, Redistribution and Salvage Branch, Corps of Engineers

Paul G. Hoffman, Pres. of Studebaker Corp. and Ch. Committee on Economic Dev.

Hon. J. W. Robinson, House Roads Committee chairman

H. E. Hilts, Deputy Comm'r, PRA

James J. Skelly, Pres. James J. Skelly Co., again heads contractors' division

Hal. G. Sours, Dir. of Hys., Ohio

Sam C. Hadden, Pres. AASHO and Chairman, Indiana Hy. Comm.

Col. Wm. N. Carey, Chief Engr., Federal Works Agency

adopted it should be designed to protect the contract system and help prevent recurrence of anything like another WPA. Therefore war surplus should not be handed out freely to local government agencies, who may be tempted to use bargain equipment in competition with private contractors.

2. War construction equipment overseas at the end of hostilities should be left there as "samples" to help foreign nations learn to utilize modern equipment and to aid rehabilitation.

3. Surplus government-owned equipment in this country at war's end should be returned to manufacturers for disposal through regular business channels.

E. I. King, procurement division, U. S. Treasury (responsible for purchase and disposal of much light construction machinery), said his division would accept only sealed bids at fair appraisal prices from private or local governmental buyers.

G. W. Van Keppel, new AED president, created a momentary sensation by telling an example of speculation and profiteering by middlemen. The U. S. engineers were said to be investigating a case in the west where eighty thousand dry-cell storage batteries were sold for $130 to a buyer who re-sold them for $27,000. The nation's 700 equipment distributors and their three thousand experienced salesmen can get the fairest prices for war machinery, and thus aid war-debt reduction.

A.R.B.A. Resolutions

A committee of industry leaders passed important resolutions:

On F. A. to Counties: That the county Officials Division expend every effort toward securing an annual Federal appropriation for improvement of rural roads not on the state or federal system; that this money shall be allocated to the states by PRA under the same formula as other Federal highway funds, and in turn apportioned to counties in ratio of ⅓ population, ⅓ area and ⅓ rural road mileage exclusive of state and federal roads.

That state highway departments act as agents for PRA in establishing standards of design, counties furnishing detailed plans, specifications, estimates and contracts for submission to the states before receiving bids.

On F. A. to Cities: Whereas construction of streets by cities will provide a widespread distribution of post-war employment to large numbers of men, and should be performed

(*Continued on page* 70)

Government Disposal of Surplus Road Equipment to the States and Sub-Divisions

By H. G. SOURS
Ohio Director of Highways, Columbus

Excerpts from paper given at recent ARBA meeting

THERE are conflicting ideas among the members of the industry and among public officials themselves as to what should be done with surplus equipment and how the problem of its disposal should be handled. Some of the questions are:

Should Federal Government give equipment to the states and sub-divisions with no cash charge? Sell to the states at a reasonable charge? Sell to speculators to dispose of as they see fit? Route back through manufacturers and recognized dealers with some price regulation?

If the Government gives or sells to states and sub-divisions, should equipment be turned over indiscriminately or should the public agencies be made to show definite need for each item?

Should any equipment be brought back from the various foreign countries and be disposed of here?

I have discussed these questions with a number of highway officials. Some agree with my ideas on the sub-

What Is Official's Responsibility?

The highway official is charged with operating his department to accomplish maximum work with least cost. He naturally feels at first impulse that if he can obtain equipment with no cash outlay or at a reduced cost he is under obligation to take advantage.

On the other hand, there is the question as to what the indiscriminate disposal of equipment would do to a large industry in the postwar period. Might it not result in a contribution to a serious disruption of our peacetime economy? Many industries may be confronted with a postwar problem of finding a market for their products unless there is some regulation of that market. Partial paralysis of any industry creates unemployment which then becomes a problem for the government to deal with.

So we can, conceivably, in one branch of government service, be guilty of creating problems which other branches will then, perhaps through some artificial means, try to correct. *I, for one, am definitely in favor of controlling the disposal of road machinery according to some plan which will not disrupt industry and shake our postwar economy.*

First of all, the equipment should not be disposed of indiscriminately, whether given or sold to public agencies. If given, the agency should be made to show definite need for each item. If sold, the chances would be less of trying to get equipment not actually needed.

The equipment should *not* be turned over to organized speculators, to be sold at what they can get for it. Either manufacturers or regular dealers who can offer proper service afterwards could handle equipment to be sold.

If there is no control of what any public agency can get, there might be a tendency to ask for many items not needed and which would, over a period of time, prove costly to own. Spare parts for aging and out-moded equipment create a problem.

Encourages Too Much "Force Account"

Too much machinery of certain types in the hands of a public agency creates temptation to enter the field of construction in competition with private industry. I am unalterably opposed to this. Force-account construction should be held to a minimum required in efficient operations of any department.

I do not favor the return of any equipment from foreign fields. Most of it will have been used hard under trying conditions. Cost of returning plus overhauling and upkeep would make it a costly venture. Much equipment now shipped to foreign countries could be used in re-construction of war-torn areas, either by us, if we do any reconstruction; or sold to other countries for that purpose.

There is a problem now in many states and their sub-divisions due to their inability to buy equipment the past two or three years. Through proper handling of government-owned equipment, it could be made available when and where needed. Later, however, when newer and more efficient equipment and models come out, some of the old items might become an expensive load to carry if the public agencies should be loaded up with them indiscriminately.

Whatever the methods of disposal eventually set up, they should be so regulated as to give the public agencies advantage of a fair plan and yet prevent serious economic disturbances.

Over 1,000 Attend A.E.D. Meeting

BY all odds the biggest and liveliest annual meeting in the history of Associated Equipment Distributors!

That was the conclusion of all who attended the recent four-day "Silver Anniversary" AED session at Edgewater Beach Hotel, Chicago.

As one onlooker explained, the big turnout, "This post-war road planning business has built up to something really big and exciting, and, too, the boys are all hot and bothered about what's to be done with government-owned equipment when the war's over. They've flocked in here to maybe get some early answers."

At any rate, over a thousand equipment men were there, representing 48 states, with a delegation of 30 from Canada and Nova Scotia and at least one from Mexico. Nationally-known speakers included Major General Eugene Reybold, Chief of Engineers; Major General Philip B. Fleming, FWA Administrator; Lt. Col. E. R. Needles, Chief of Redistribution and Salvage Branch, Military Supply Division; T. Spencer Shore, vice-president, General Tire & Rubber Co., and others. Panel discussions were held dealing with various present and post-war problems.

Van Keppel New Pres.

New AED Officers: *President*, G. W. Van Keppel, G. W. Van Keppel Co., Kansas City, Mo., succeeding Ed. P. Phillips, Richmond, Va.

Vice-Presidents, H. O. Penn, H. O. Penn Machinery Co., New York City (exec. v.p.); Frank B. McBath, Columbia Equipment Co., Portland, Ore.; A. E. Hahnan, Tractor & Machinery Co., Atlanta, Ga.; R. S. Patten, Patten Tractor & Equipment Co., Chicago.

Treasurer, W. W Bucher, of R. E. Brooks Co., New York. *Executive Secy.*, C. F. Winchester, Washington, D. C. (both re-named).

Post-War Equipment Problem

Most urgent and controversial of the many problems discussed—and one whose solution directly concerns the entire highway industry and profession—is that of how army and navy owned surplus construction equipment should be disposed of after the war. Two important resolutions on this subject were passed. One urged that distribution of such equipment be confined to established trade channels; acquisition of large quantities of such equipment for speculative purposes be prohibited; price lists be uniform and at levels which would assure a fair return to the government; sale or lease be held at a rate not unduly disruptive of trade and commerce, and that the welfare of small business enterprises be considered whenever possible.

In manufacturers' and distributors' round-tables on the subject, D. D. Guilfoil, of Sauerman Bros., said that the government's duty is either to put its surplus equipment to work or sell to someone who will. Warning of the possible disturbing effect of the government "going into the machinery business," he urged consideration of two possible solutions: One, a federally sponsored disposal agency comprising mainly manufacturers and distributors; the other, a corporation privately organized and financed by the industry to take over and sell equipment.

Huge War Needs Continue

Henry Hale, director, WPB Construction Machinery Division, foresaw no immediate lessening of military demands for construction machinery. Equipment manufacture rose to $330,000,000 in 1942 and to $721,000,000 in 1943, with unfilled orders of $550,000,000 in June and $690,000,000 in Sept., 1943. About 90% of track-type tractors, shovels and cranes produced are now going overseas and "not much is expected to come back."

Capt. L. N. Moeller, of the Navy, pointed out that construction equipment has become as important as landing craft. Nearly all new equipment goes to the Seabees. Service life rate is figured at less than a year. Of a current inventory of $64,000,000 (new value) in navy-owned units on hand in this country, mostly taken from recently completed bases, etc., $16,000,000 worth is being disposed of to navy yards, $2,000,000 to the army, $1,000,000 to contractors, $3,000,000 is scrap or obsolete and the rest is being held at repair depots. Twenty million dollars worth will be rehabilitated for advance bases, ten millions for domestic navy use, and only $12,000,000 worth is "surplus," available for sale or rental to contractors at OPA ceiling rates.

G. W. Van Keppel heads distributors for '44

Lt. Col. E. R. Needles, Redistribution and Salvage Branch, Corps of Engineers, outlined the army's ideal, which is for all construction equipment to be used up or out of the country when the war ends.

Of 100,000 units recently made available by cessation in domestic construction, 75,000 have been reassigned. "The equipment surplus problem will largely disappear in six months if the present military demand continues," ventured Col. Needles speaking unofficially. He see need all over the world for our "surplus" equipment in the huge post-war rehabilitation task.

Morton R. Hunter told of the work of the WPB's committee on used equipment. Consisting of 35 men from various agencies this committee recommended that the problem be dumped partly back on WPB industry committees; that equipment be classified as to government departments that could use it and offered first to them, then excess units offered to anyone doing essential war work, or sold to highest bidder from industries for which equipment is suited.

Plenty of Equipment for Post-War Construction

While both Capt. Moeller and Col. Needles tended to minimize the surplus problem, several manufacturers' representatives took another view. F. Salditt, vice pres. of Harnishfeger Corp., reminded that the government in the past hasn't been able to get highest prices for equipment, and that it should let some private agency participate, with distributors doing the actual selling under an intermediate financing agency such as RFC. The WPB industry advisory committee should have a complete inventory ready at the war's end.

(*Continued on page* 96)

View of the destroyed bridge, showing hand shovelers cleaning up rubble with help of a dozer, and pneumatic drills at work in preparation for blasting old masonry

Army Rebuilds a Bridge in Sicily

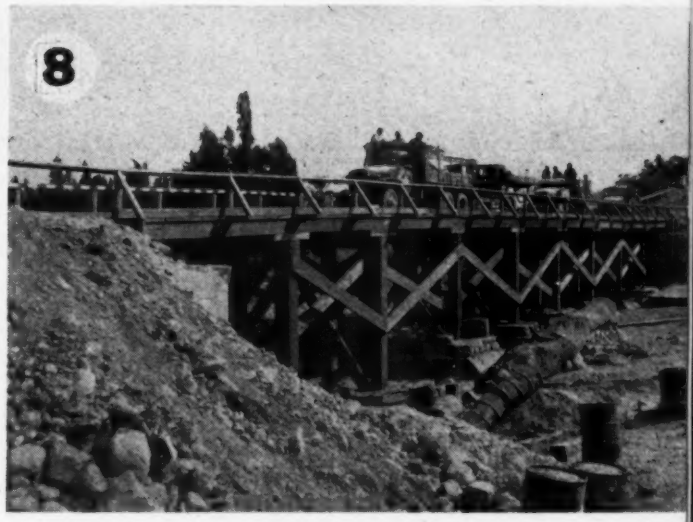
BRIDGE repair and reconstruction is one of the jobs that the U. S. Army engineer troops have learned to do with great speed and resourcefulness. Here is an example of a project in Sicily, with photos released to ROADS AND STREETS by the War Department. As you visit this job through the eye of the camera, you might imagine that here at work is some of the very equipment you'd be using today at home, if—

First to get a good pier bearing. Short footing timbers were set in the trench and well bedded

Italians shoveling concrete from one of their own mixers onto a G. I. truck

Reconstruction is greatly speeded by modern saws. At left ,the boys are cutting uprights with a gasoline driven cross-cut. At right, with a pneumatic circular saw

Raising a bent into position with the aid of a half-track winch



She's done! A sturdy, fine job, all done in a matter of hours

First Illinois State Asphalt Conference

With the cooperation of the Illinois Division of Highways, the Asphalt Institute is sponsoring the speaking program of a State Asphalt Conference, to be held at Hotel Abraham Lincoln in Springfield, Ill., on Feb. 23rd and 24th.

This conference, the first of its kind, is for the purpose of discussing with state, county, city and other highway officials, the use of asphalt not only under wartime conditions but in the postwar period.

The conference is being handled by a general conference committee composed of all the interests directly and indirectly interested in the Asphalt Industry, as follows:

H. B. Pullar, Chairman; D. R. Donlen of The Texas Co., representing asphalt producers; Donald White of White Consolidated, Inc., representing contractors; Howard Bridges of Bitucote Products Co., representing emulsion manufacturers; H. A. Barber of Barber-Greene Co., representing equipment manufacturers; B. L. McKay of Great Lakes Asphalt & Petroleum Co., representing material supply men; H. W. Skidmore of Chicago Testing Laboratory, representing testing laboratories; G. J. Berkley of Skokie Valley Asphalt Co. and Secretary, Black Top Roads Association, representing asphalt applicators and distributors; and H. Krause of Columbus Quarry Co., representing aggregate producers.

H. B. Pullar is also vice president of the Asphalt Institute in charge of its activities in the Chicago area.

The conference program, after the opening keynote addresses by Walter A. Rosenfield, Director of the Illinois Department of Public Works, and Wesley W. Polk, Chief Highway Engineer of the Division of Highways, will be devoted entirely to an open-forum discussion of asphalt's uses, primarily in Illinois.

▼

Virginia Road Builders' Ass'n Organized as A.R.B.A. Affiliate

Organization has been completed of the Virginia Road Builders' Association, as an ARBA affiliate, according to Charles M. Upham, Engineer-Director. The Virginia group includes engineers, highway users, contractors, equipment dealers, highway officials, material dealers and others interested in good roads. Kenneth L. Black is president, and A. J. Rayner executive secretary, both of Richmond.

▼

States Slashed Debts in '43

Thrifty management combined with prosperous conditions and curtailment of construction and other activities, resulted in a marked improvement in the financial status of states, according to Frank Bane, executive director of the Council of State Governments. Reduction on over-all gross debt of 17.5 per cent has been effected since 1940.

All states took notable action on post-war construction planning of twenty states' unified state laws and regulations governing interstate trucking and war goods transportation.

NEW JERSEY SNOW REMOVAL DATA

Year	*Average Monthly and Annual Snowfall*								*Snow Removal Cost*			Year
	Jan.	Feb.	March	April	Oct.	Nov.	Dec.	Annual	Cost	Miles	Cost per Mile	
1922	11.1	8.5	3.7	T	0.0	0.2	7.3	30.8	$216,028	650	$332	1922
1923	16.6	13.8	6.3	0.5	0	0	2.6	37.7	253,853	698	364	1923
1924	1.4	11.9	2.7	6.6	0	1.3	4.3	25.0	154,892	745	208	1924
1925	22.8	0.7	0.3	T	1.7	0.7	0.6	25.4	263,000	816	322	1925
1926	2.4	21.2	0.4	T	0	T	8.2	32.2	322,109	814	395	1926
1927	7.9	5.1	0.3	0.3	0	0.1	T	13.7	174,588	870	200	1927
1928	8.3	4.4	4.9	0.9	T	0.3	2.7	21.5	142,606	899	159	1928
1929	1.6	9.2	0.7	T	T	0.4	4.1	16.0	126,188	961	131	1929
1930	5.9	4.2	0.1	T	T	0.2	5.2	15.6	70,995	1,113	64	1930
1931	1.6	3.0	2.0	T	0	1.6	0.4	8.6	87,492	1,258	69	1931
1932	1.5	2.2	2.5	T	0	T	10.1	16.3	99,418	1,361	73	1932
1933	1.2	10.4	1.7	0.2	T	0.6	7.4	21.5	162,474	1,419	114	1933
1934	0.2	22.7	9.6	T	T	0.1	0.1	32.7	447,136	1,460	306	1934
1935	15.8	6.8	1.5	0.3	0	2.1	9.7	36.2	512,636	1,513	339	1935
1936	9.1	9.6	1.4	0.1	0	[illegible]	0.6	22.1	497,463	1,549	321	1936
1937	2.2	3.8	4.3	T	T	0.2	0.6	11.1	185,001	1,672	105	1937
1938	4.0	1.1	1.2	2.8	0	12.6	1.4	23.1	294,407	1,590	185	1938
1939	10.2	2.0	2.0	0.1	0	0.2	3.9	18.4	436,123	1,593	274	1939
1940	5.6	12.2	3.3	2.2	0.7	1.0	3.1	28.1	665,724	1,602	415	1940
1941	8.8	8.8	12.6	0	0	0	0.4	32.6	835,255	1,607	519	1941
Averages	6.9	8.1	3.2	0.7	0.1	1.1	3.6	23.7	.....	1,642	...	1942 Average

4,300 FT. ACCESS STREET ELEVATION

Seattle's worst war-industry traffic bottleneck eliminated by project which was beleaguered by material shortages and restrictions; MacRae Bros., contractors

By GEORGE H. SHEARER
District Engineer, Washington Department of Highways, Seattle

SEATTLE has a new overpass street that whisks trucks and war workers and jeeps across an industrial area which formerly was the scene of creeping, horn-honking bedlam every shift change and many times between. The elevated street is Spokane Street, principal thorofare connecting downtown Seattle with Harbor Island and West Seattle. Extending from Diagonal Avenue to 6th Ave. S.W., the structure comprises a main deck 4264 ft. long plus 3 parallel side ramps at important cross streets and one ramp leading at right angles down into 4th Avenue S., principal mid-point arterial leading downtown. Eastward from the side ramps at 1st Avenue the main deck is 4 lanes in width; Westward from the ramps, where the maximum traffic volume occurs, the deck is 6 lanes wide. The bridge provides grade separation at seven street or rail crossings. The latter including eleven tracks of four railroads.

General Design Features

Consisting of reinforced concrete piers and heavy T-beam deck between street or rail points, with H-girders at crossings, the bridge involves no unusual structural features. The end approach ramps are of semi-permanent construction (concrete pavement carried on heavy timber bents and floor stringers with concrete bridging between stringers) reflecting the city's expectation of extending the structure both east and west at some not-too distant future date. Between-street panels, general 40½-ft. span, are of continuous concrete design, with split-column expansion joints every 3 or 4 panels. Street-crossing H-beam spans are 22 to 75 ft. Split columns are doweled to footings. Intermediate columns rest on bearing surfaces recessed into the footings, being designed to act without bending restraint. All footings rest on piling driven 30 to 50 ft. into saturated below-datum soil.

The reinforced concrete deck is 6½ to 8½ in. in depth, designed for H-20 loading.

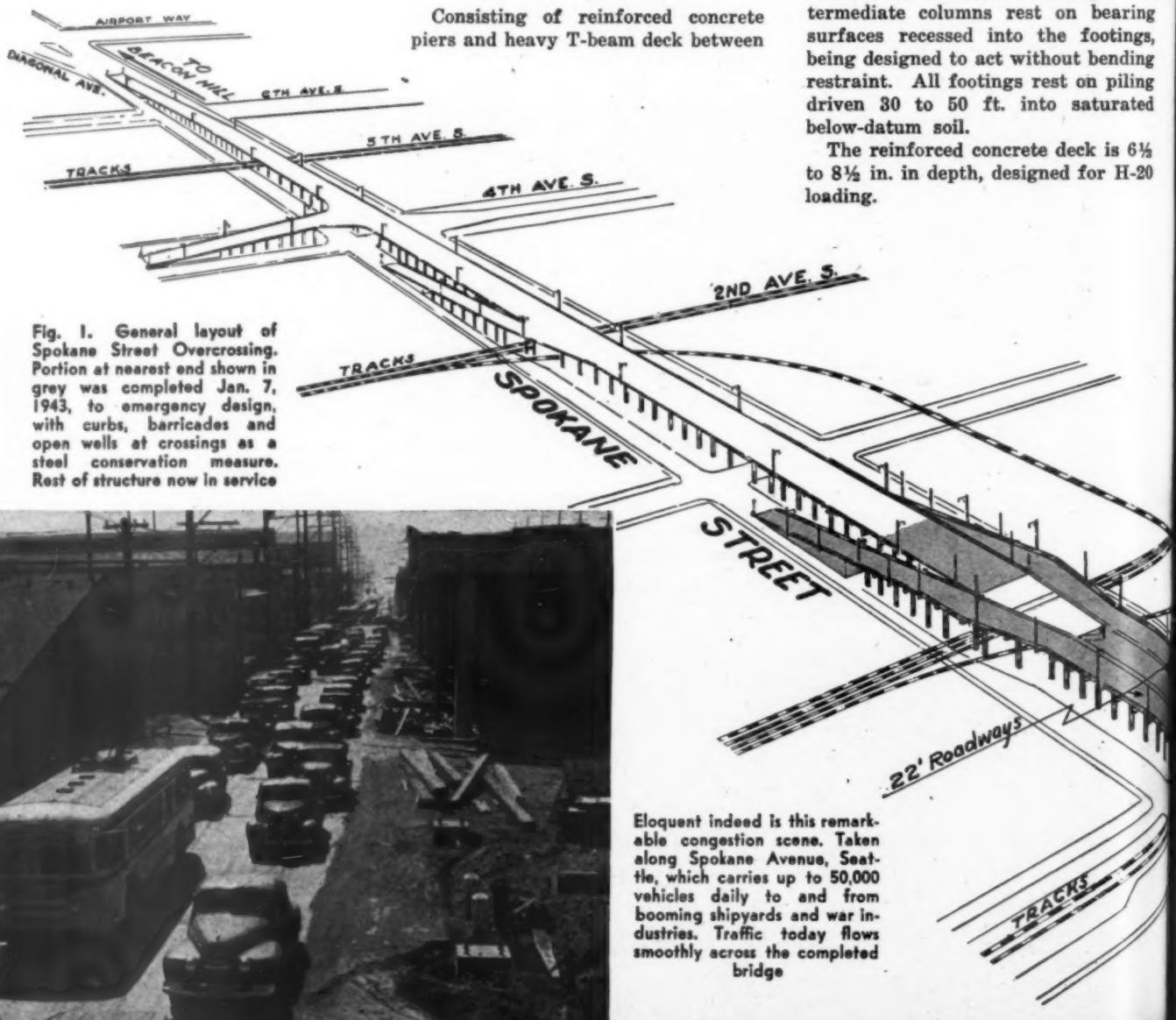


Fig. 1. General layout of Spokane Street Overcrossing. Portion at nearest end shown in grey was completed Jan. 7, 1943, to emergency design, with curbs, barricades and open wells at crossings as a steel conservation measure. Rest of structure now in service

Eloquent indeed is this remarkable congestion scene. Taken along Spokane Avenue, Seattle, which carries up to 50,000 vehicles daily to and from booming shipyards and war industries. Traffic today flows smoothly across the completed bridge

SPEEDS SEATTLE WAR EFFORT

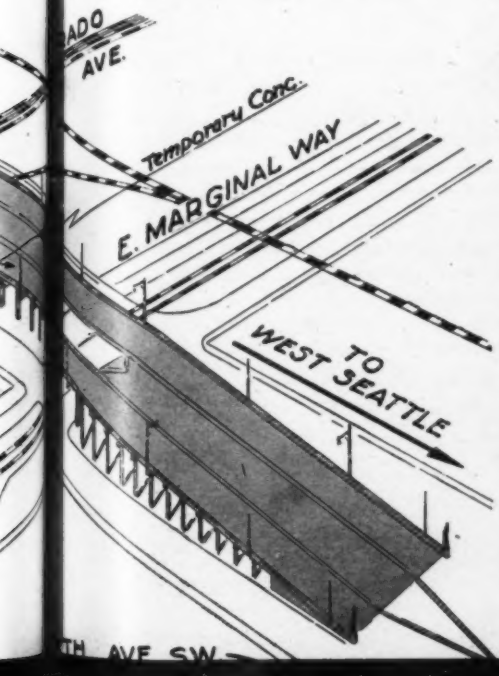
So much for the general features. More unusual were the problems and vicissitudes of erecting this bridge in post-Pearl Harbor times.

Contract was awarded to MacRae Bros., Seattle, December 23, 1941, for $968,855. An A-1-e priority was secured, ordering of materials began, and construction work was started in January, 1942. Concrete forms were fabricated in panels designed for repeated use. Certain design changes involving footings, railings and other details were made to reduce or eliminate reinforcing. Then came hitches in steel procurement and delays on the job. It was expected that structural steel would be on hand for the first two street crossings as soon as piers were ready, and other crossings later on a next time schedule. First steel, then timber, proved unobtainable. Nearly half of the steel already sent to the fabricating plant was unavailable until a higher priority could be secured, and the whole project was threatened. State and city officials appealed vigorously, supported by newspapers, labor leaders and congressional representatives.

Job Forced to Shut Down

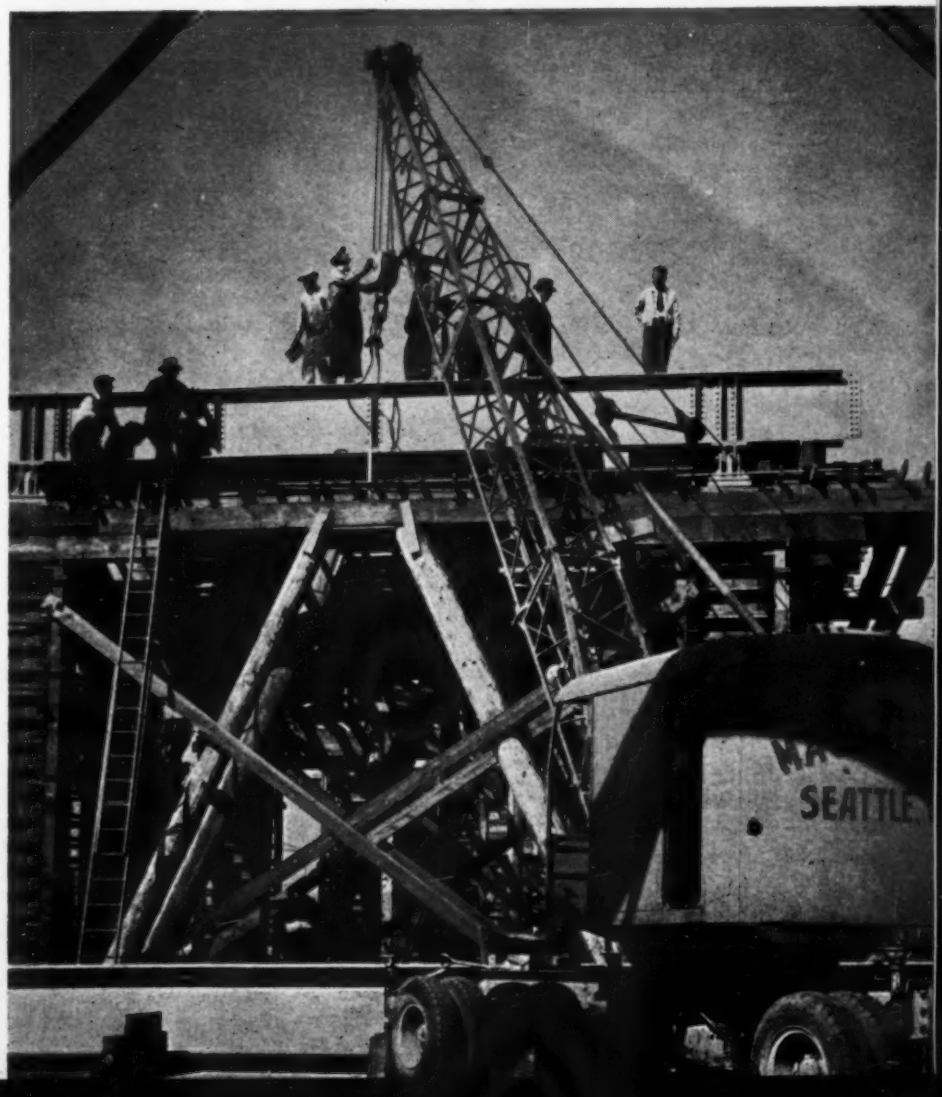
Finally on June 30, 1942, the priority expired and no rating existed. From then to Aug. 22 work drifted to a standstill as materials on hand were becoming exhausted and preparations were being made to close down the work.

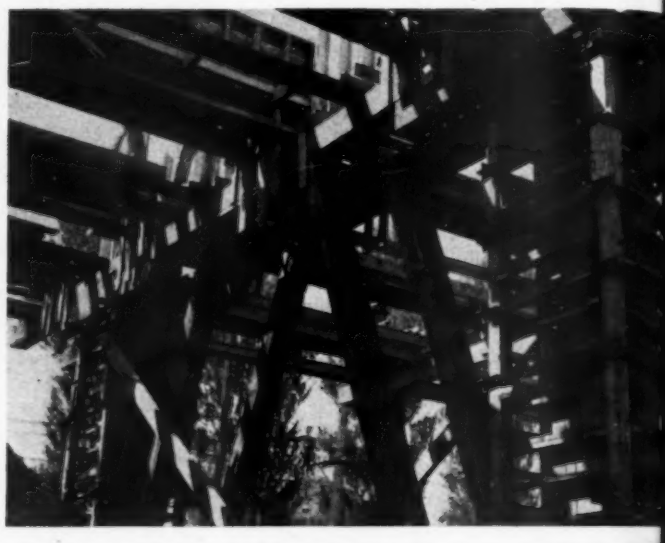
In the meantime, attention was turned to the possibilities of completing the west end in some manner so



At west end of job—center reflector curb in place but fenced off for 2-lane operation until after the war

Setting beams for overhead street crossing, with kabitzing being done by Lloyd and Peter MacRae and E. J. White of the Seattle contracting firm, MacRae Bros. The truck crane did a fine job on this project





Showing concrete deck and bridging forms in place, and details of semi-permanent timber piers and 8x18-in. stringers used for end ramp spans

Top view: General view of forming details and beam setting operations on Spokane Avenue job after MacRae Bros. resumed work under the new 1943 contract

Details of forming, showing how the 6x6-in. corner posts act both as stiffeners in the column assembly and as end supports for cross-beam and deck forms

Top view: How the center lanes were left open at street crossings, due to material shortages. Barrier curbs will be removed when center portion is ultimately completed.

traffic could get across from 1st Ave. So. to 6th Ave. S.W. It was found that steel still on hand could be utilized through re-design to partly complete two street crossings. Also some reinforcing on hand could be re-fabricated for immediate use in the west part of the structure. And 70 tons of additional reinforcing necessary was found to be obtainable from an Oakland, Calif., steel company. Then W.P.B. agreed to renew the bridge's priority rating to permit acquisition of this steel.

With this progress it was found possible to complete two 22-ft. roadways over two streets, ramps at the Colorado Avenue, and the main roadway except for center gaps in the deck for several hundred feet to the west approach.

The foregoing scheme which was carried out, also involved other considerations. Extensive excavation already made in the existing roadway for footings on eastward were backfilled and paved over and other safety or clearance provisions made.

Naturally the contractor's costs went up and extra compensation was demanded to cover extra handling of materials and equipment, waste, refabrication of material, etc. Patching up of the west end was completed under a supplemental agreement and on January 17, 1943, the overcrossing between the 6th Avenue S.W. and the Colorado Avenue ramps was opened to traffic. This portion of the structure, representing 54% structural completion, was "finaled out" at a final estimate of $637,012. Subsequently, following a review of the urgent necessity of the entire elevated structure, the project was revived under an AA3 priority assuring necessary materials, readvertized and a new contract let, with MacRae Bros. again the successful bidder at a figure of $496,169.80.

As against the original estimate of $1,200,000 including right of way, the cost of the complete bridge is about $1,250,000. Of this $340,000 came from federal grade crossing funds, $150,000 federal access road funds, a sum of $250,000 from the railroads, and the remainder from city (state gas tax funds).

Temporary Barrier Curbs

Several design and construction features of the bridge as built are worthy of note. One is the provision of barriers to channelize traffic along the outer 22 ft. on either side of the deck. A combination of 3-ft.-high concrete wall and timber guard rail surrounds the "wells" left open at street crossing spans to save materials. Plain, concrete curbs of prison-shaped cross section, 9 in. high, were cast in place along paved portions of the center lanes. These details are shown in the accompanying photos, as is the placement of white cement reflecting-plane center curbs to divide the 6-lane roadway after removal of temporary curbs and barricades.

Column Forms Help Carry Deck Load

Column form costs were reduced and the job speeded by assemblying column reinforcing within pre-assem-

bled column forms at a central yard alongside the job. Form panels were built with the aid of power bench and hand saws, while at the same time another crew assembled and wired the reinforcing assembly inserted it within the completed form and tied it securely in position. Column units were handled and loaded with a stiffleg, and hoisted from a truck to position by a mobile crane.

As also shown in accompanying photo, the column form assembly included 6 x 6-in. posts outside the walers at each corner. These posts serving the double purpose of holding the column forms true and helping shore up the deck forms. The posts rest on the concrete footings located 5 to 10 ft. below ground in open sheeting. Columns were detailed for quick knock-down of four side panels.

Deck forms were supported by the above noted column-form posts in combination with heavy "A" poles at each bent, and by 5-pile falsework bents at mid-panel.

Steel for the street and railway overheads, and in fact nearly all high lifting of heavy falsework formwork and reinforcing, was handled by means of mobile cranes. A truck-mounted timber wrecking crane built by the contractor transported and unloaded much of the material. Superstructure concrete was hoisted to a skip at deck level and placed with buggies. All concrete was delivered ready-mixed by Pioneer Sand & Gravel Co.

Acknowledgments

The Spokane Avenue overcrossing was designed by the city and built under state department of highways direction, with R. M. Murray and H. H. Damman serving successively as resident engineers. George H. Shearer is state highway district engineer at Seattle; O. R. Dinsmore, construction engineer; Ralph W. Finke, bridge engineer. Burwell Bantz is state director of highways and C. L. Wartelle, city engineer of Seattle.

Partial Equipment List

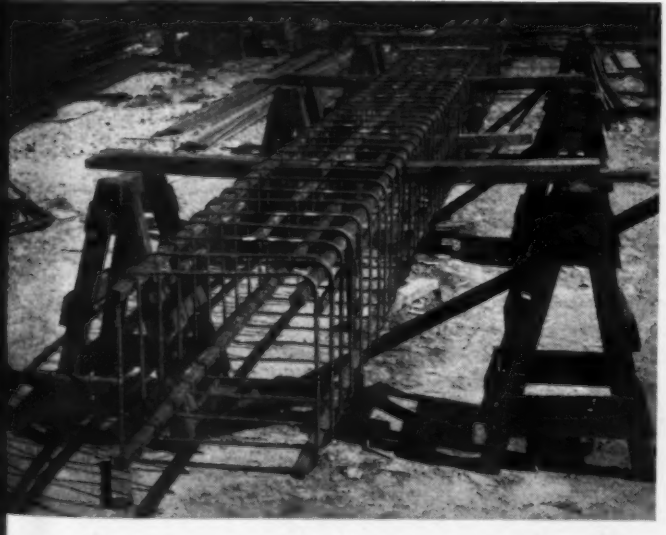
Equipment put on the Spokane Avenue job for the original contract included:

2 Dump trucks (Ford 2 C.Y.)
1 Flat bed truck (Diamond T, 2-ton) with cherry picker and 5-ton hoist
1 Semi-trailer truck (Diamond T)
1 Logging truck (Diamond T)
1 Bulldozer (AC-50)
1 Elec. yard crane (cap. 15T at 75°)
1 Rubber tired crane (General 15T)
2 Compressors (105 cu. ft.)
2 Elec. welder (400 amp. and 200 amp.)
2 Acetylene burner outfits
2 Jack hammers
1 Pile driver (Vulcan) single acting steam hammer with 3-drum hoist
1 Power shovel (Koehring ¾-yd.) also used to drive piles
1 Power saw (12" Dewalt)
2 Power saws (16" Table)
4 Hand power saws (Speedomatic and Skilsaw)
6 Concrete vibrators (air or electric)
1 Portable concrete hoist (2-drum, 35 h.p.) and tower
1 Portable concrete hopper with ramp
10 Buggies
1 Blacksmith shop—equipped with forge, power grinder, drill press and bolt machine
4 Forges for rivets
6 Riveting hammers
4 Power hand drills (air and elec.)
3 Pumps (gas)
1 Conc. bucket (1 cu. yd.)
2 Conc. breakers
Small tools

▼

Through Traffic in Cities Small—Studies by the Traffic Bureau of the Indiana State Highway Department in three cities in that state showed that the actual through traffic in cities of 50,000 to 100,000 population constituted but 8 to 12 per cent of the total traffic movement.

Column assembly in progress at central yard. The completed cage was set onto one side panel of the column forms with a derrick, and forms completed in the position shown for trucking to location



Power saws speeded fabrication of column and deck forms. The contractor's forming costs were kept low by careful form design, systematic methods of fabrication and labor-saving equipment

PATCHING PAVEMENTS with Soil-Cement

Filling prepared "cavity" with loose soil-cement mixture. U. S. 70 near Greensboro, N. C.

How North Carolina has used this material on various road types since 1939

By W. VANCE BAISE

State Highway Engineer, North Carolina State Highway and Public Works Commission, Raleigh

SUCCESSFUL use of soil-cement for patching on a dozen state and federal highways, both primary and secondary, in the Greensboro division of the North Carolina State Highway and Public Works Commission for a period of four years, has definitely marked it as an economical and easily handled material for one of the most important phases of highway maintenance, especially in wartime when economy and permanence are spotlighted.

The soil-cement patching method is now in use on a somewhat smaller scale in some other divisions, and the results obtained up to the present time are very encouraging.

Experience Dates from '39

It was in 1939 that the Commission began to use soil-cement as a substitute for traffic-bound stone and bituminous materials in patching primary and secondary roads, particularly on sections where subgrade failures were responsible for surface breakups. At that time, soil-cement was a relatively new road building material used in the construction of all-weather secondary highways, but its success in a number of states led us to believe that its application to patching would bring similarly successful results.

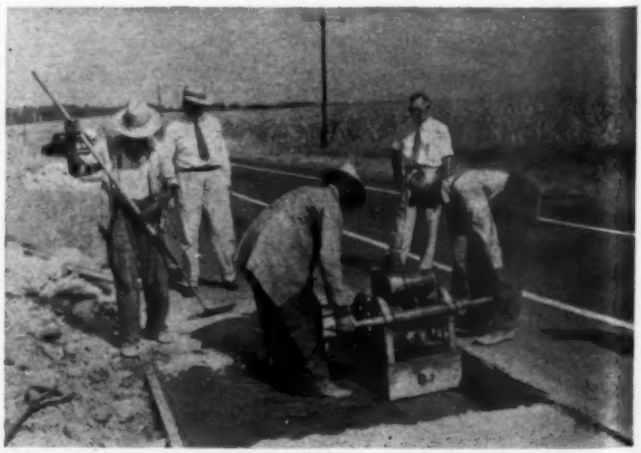
It so happened in that year that N. C. 49 in the Greensboro division of the state highway system was in need of extensive subgrade repair. In the 18-mile stretch between Haw River and Prospect Hill, a considerable number of surface failures developed in this flexible type road due to unstable pipe-clay subgrade conditions. It was decided, therefore, to make this piece of roadway a test section for soil-cement subgrade patching. In short, the work was undertaken with notable success, and although four years have passed, the repaired portions of the highway have stood up under traffic with no apparent signs of deterioration.

Compared with traffic-bound stone or bituminous patching, soil-cement appears to have certain advantages because it provides a rigid material that virtually assures a satisfactory type of repair. Moreover, its placement in the roadway involves simple operations that can be carried on efficiently with prison labor which is available for this kind of maintenance work. Another advantage is found in the cost of processing and placing, which compares favorably with other methods of patching previously undertaken.

Two Different Methods

Patching thus far has been undertaken on the main, heavy traffic highways with a concrete base and sheet asphalt top and on the flexible type roads, most of which carry a smaller volume of traffic.

Sub-grade excavated below old pavement. Note slab undercut already for placing soil-cement as a base under concrete patch and bituminous top



An important step in preparation is thorough compaction in layers by means of a vibrator

WHERE NOTHING BUT *All-Wheel-Drive* COULD GET THROUGH

Out in the Imperial Valley of California, the public owned utility which diverts and distributes irrigation water to 500,000 acres of farm lands, had a not uncommon problem. Some method of keeping down the rank growth of weeds and moss on the ditch banks had to be found, to prevent choking up the channels and retarding the flow of water.

Solution of the problem was found in equipping a fleet of Marmon-Herrington *All-Wheel-Drive* converted Ford trucks with flame throwers. With ability to travel through the soft weed-covered ground, up and down the ditch banks, the Marmon-Herringtons enable the weed-burning crews to keep the vegetation under control over 3,000 miles of ditches.

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Showing another type of vibrator used in patching U. S. 15 near Durham, N. C. Also the 2-bag mixer set-up typical of that used on soil-cement patching operations

Two different methods are followed in placing soil-cement patches on the main routes. In preparing patches for areas less than 10 ft. square, the old top, the concrete base and subgrade material are removed and the resultant "cavity" filled with a minimum of 11 in. of compacted soil-cement. It is not uncommon to remove considerably more subgrade material, depending on the character of the material encountered, and place soil-cement to a depth of 18 in. The last step in the operation is the placing of a 1-in. pre-mixed bituminous wearing surface.

In patching areas more than 10 ft. square, the procedure involves removing the top, the slab and subgrade material to a depth of 6 in. below the slab. In final preparation of the "cavity" before placing soil-cement, workers are careful to remove subgrade material for several inches directly under the old slab itself adjacent to the patch. The soil-cement is then placed to a compacted depth of 6 in., being hand-tamped securely under the bottom edges of the slab to form a sort of anchor filling. Put down in this manner, the soil-cement forms a stabilized base over which concrete patching is placed to bond with the original concrete base.

The two methods described above were followed in patching work on U. S. 70 east of Greensboro this year. Patching work has been under supervision of T. A. Burton, Greensboro division engineer.

In patching the flexible types of highways, the old base is removed and the "cavity" filled with a minimum of 6 in. of compacted soil-cement, over which is placed a pre-mixed bituminous wearing surface approximately 1 in. in depth. Of course, a deeper soil-cement patch may be required for effective repair of some base conditions.

Stone screenings or disintegrated granite from local pits have been found suitable for mixing with cement and water to form the soil-cement patching mixture. Prior to starting a patching project, samples of the screenings and granite material are tested in the state highway department's soils laboratory at Raleigh in order to determine the proper amount of cement required for the soil-cement mixture. On jobs completed to date, the cement requirement has ranged from 8 to 10 per cent by volume.

The soil-cement material is mixed in two-bag concrete mixers at central mixing locations and trucked to the job. Stock piles of screenings trucked from the pits assure an adequate supply at all times. At present eight mixers are utilized in the patching operations in the Greensboro division.

Mixed soil-cement is placed in the "cavity" in layers. Loose material dumped 3 in. in depth attains a compacted depth of 2 in. The surface of each layer is scratched with a rake before the next layer of loose soil-cement is dumped. This surface roughening assures proper bonding with the succeeding layer. Compaction is accomplished by hand tampers and vibrator tamps. The final layer is smoothed and compacted with a 3-ton steel roller and a dual-tired truck fully loaded.

On highways carrying heavy traffic, barricades protect the new soil-cement patches for a period of 24 hours, after which they are opened to traffic for a period before the wearing surface is placed. On light-traffic roads, the patched areas are opened to traffic immediately.

Completed patches on U. S. 15, consisting of bituminous top and concrete base supported on a layer of soil-cement

Emulsified Asphalt Runway Methods at Ballston Spa, N. Y.

Procedure adjusted to wide variations in materials, moisture, temperature. Close contractor-engineer cooperation, skillful use of equipment, result in excellent job on CAA airport

By H. K. GLIDDEN
Chief, Airways Engineering Branch,
1st Region Civil Aeronautics Administration,
La Guardia Field, New York

THE Ballston Spa Airport is located near and owned by the Village of Ballston Spa, N. Y. Its construction with Civil Aeronautics Administration funds, under the current airport program, was undertaken after the project had received the approval of the Airport Approval Board, consisting of the Secretaries of War, Navy and Commerce.

Since there has been an unusual amount of interest displayed in the emulsified asphalt type of pavement on this project, it is my aim to pass on to other interested engineers and constructors what I believe to be useful and helpful information on the pavement design and construction.

Close-up during mixing of base (av. 600 cu. yd. per day). Ballston Spa Airport stands as an excellent example of emulsified asphalt construction, result of close and resourceful cooperation between field engineers, contractor and office

Design of Pavement

The plans and specifications were developed in the office of Herbert DePue, Superintendent of Airways, First Region, Civil Aeronautics Administration (CAA), LaGuardia Field, N. Y. These were reviewed and approved by the Airways Division, Washington office and Airport Division offices located in Washington, New York and Boston. The decision as to allowable types of paving construction was based on field surveys of local conditions and extensive laboratory tests of local and aggregates in place on the runways and adjacent thereto, as well as a study of various aggregates economically available in the vicinity. The surveys and laboratory tests conducted indicated conclusively that a blend of the sands found in place on and next to the runways, gave excellent stability by the Florida Bearing Value Test Method.* Suitable aggregates for concrete pavement were also found to be available locally.

Laboratory research also showed excellent test results on mixes using the same sands with the proper quantity of emulsified asphalt as determined by applying the following CAA specification formula:

$$P = \frac{(.05A + .1B + .5C) \times K}{\text{Per cent Residue by Distillation}} \text{ in}$$

which P equals total per cent by weight of emulsion based on the weight of the graded mineral aggregate.

A equals the per cent of the mineral aggregate retained on a No. 10 sieve.

B equals the per cent of mineral aggregate passing No. 10 and retained on No. 200 sieve.

C equals the per cent of the mineral aggregate passing a No. 200 sieve.

K is derived by past experience in paving and gives a definite control, both on variations of per cent asphalt contained in an emulsion and the type of aggregate used. For base course, the value of K should vary between 35 and 45 according to the absorptive properties of the aggregate; 35 being used for hard, non-absorptive aggregate, and 45 for highly absorptive aggregate.

The sand, practically all of which passed a No. 10 sieve, varied from 0.3% to 25% passing No. 200. All tests on samples of sand as taken, or blends of the sand coming within the range of 4% to 12% passing a No. 200 sieve, met the minimum required stability of 30 psi. for untreated sand. The same samples when treated with emulsified asphalt in the amount determined by the above formula showed a stability of well over the 100 psi. minimum considered satisfactory, when tested by the Modified Florida Bearing Value Test for emulsified asphalt sand mixes.

Sand for Base, Limestone for Surface Course

Field investigations showed varied depths of pure sand in a glacial stream bed. In addition to providing sand for the base-course, this bed also provided an adequate and well drained subgrade. It would have been impractical to import aggregates for the subgrade and base-course of equal value to the sand to be found on the site. It was, therefore, obvious that this aggregate, in the interests of economy and good construction, be utilized.

The laboratory tests referred to, definitely indicated that the best way to use the available aggregate for base-course was to mix it in place with a stabilizing admixture. After due consideration, emulsified asphalt having power adhesive qualities for binding the sand particles and proper penetration and ductility for long life, used in the proportions determined by the formula previously referred to, was selected to secure the required stability.

Good crushed limestone of proper grading was available for an emulsified asphalt dense-aggregate cold-mix surface, on short haul. All engineers consulting on the pavement design agreed on these materials for the sur-

*The Florida Bearing Value Test Method, developed by the State Roads Department of Florida to determine the suitability of sands for bituminous mixes, is described in the Department's Bulletin No. 3, "Sand Bituminous Road Mix", issued May 1, 1937. It is also described in Standard CAA Specification P-607.

(Upper): One-half runway graded, ready for windrowing. Traveling plant mixing
(Middle): Showing sand windrow on left sand-emulsion mixed windrows on right
(Lower): Initial compaction with rubber-tired roller

face-course mix. The same surface-area formula used for determining the percentage of emulsion in the base course was used, except that the method of determining the factor K was as follows:

Factor K is derived by past experience in paving and gives a definite control, both on variations of per cent asphalt contained in an emulsion and the type of aggregate used. For surface course the value for K should vary between 55 and 65; 55 being used for a hard, silicious, non-absorptive aggregate; 65 for soft, porous, absorptive limestone.

Cross-Section Design

The directive issued in connection with this airport called for the construction of runway and taxiway pavement capable of withstanding continued operation of aircraft having a 15,000 lb. wheel loading. It was determined that a 6-in. thickness of travel-plant emulsified asphalt-sand mix base (CAA Spec. P-204) and 1½ in. of emulsified asphalt dense graded central-plant-mix surface course (CAA Spec. P-202, 408) or a 6-in. uniform non-reinforced concrete pavement, were adequate to meet the wheel load requirement.

Tests showed clearly that both concrete and asphalt would prove satisfactory and competitive bids were received on the two types. The flexible type proved to be, in this instance, $30,000 cheaper than the concrete pavement. The contract was, therefore, awarded in an estimated amount of $304,217 on the basis of the emulsified asphalt sand-mix base course and emulsified asphalt dense-graded central-plant-mix surface course, to the Kellam & Shaffer Company of Schenectady, N. Y. At the same time, a contract was awarded to Frank Stento & Son of Binghamton, N. Y., for clearing and grading at $216,330.

Construction on the Ballston Spa project was under the direction of the Chief, Airways Engineering Division, Civil Aeronautics Administration, La-Guardia Field, N. Y. N. Earle Kellam directed the work for Kellam & Shaffer. The American Bitumuls Company, Baltimore, Md., furnished the emulsified asphalt to the contractor and cooperated in test control of mixes. Engineering and supervision were handled by engineers out of La-Guardia Field under direct supervision of W. O. Deibler, project engineer. Paving work started in September, 1942, and was completed in July, 1943, giving a very wide range in weather conditions and temperatures encountered.

Base Construction Adjusted to Weather

During the grading, samples of the sand both on and off runway locations, were taken and sieve analyses made to determine suitability for the base. Sufficient information was obtained from these tests so that material of desired gradation could be "spot" dumped for blending wherever needed to bring the material in place within the gradation limits necessary for the specified stability. Blending operations were carried on with the usual grading equipment, supplemented by disc harrows bringing the surface to uniform grade and cross section before windrowing.

The work was laid out in strips 18 ft. 9 in. wide, four strips on each side of the center line of the full-width runway. As soon as a runway section of sufficient size to permit economical operation of equipment was brought to true grade and cross-section, the blended base material was moved into windrows by blade graders. Care was taken to get all aggregate required for the 6-in. compacted depth of base into the windrows, leaving a well compacted, uniform subgrade, which was checked for elevation, between the windrows.

Well Equipped Field Office

All windrows so constructed were marked off in 200-ft. sections from which representative samples were taken. Sieve analyses were made at a well-equipped field laboratory, set up adjacent to the project engineer's office for the purpose of establishing a fineness modulus so that the correct amount of emulsified asphalt necessary to coat all aggregates properly could be accurately determined

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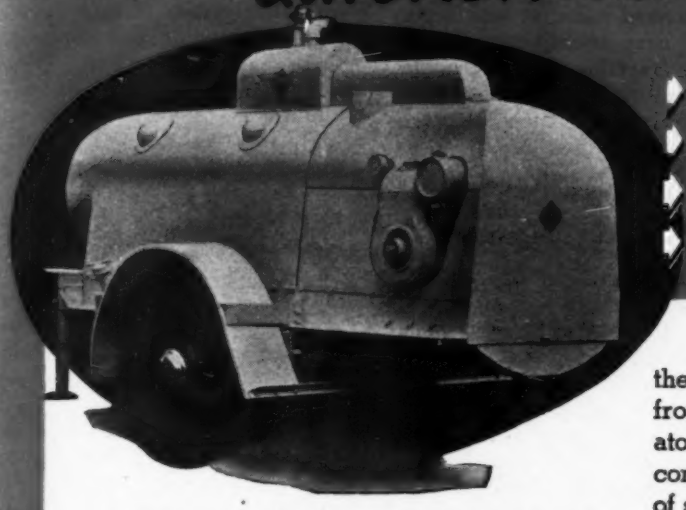

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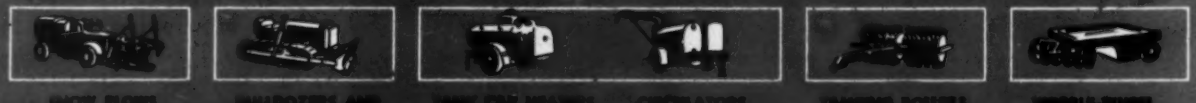

in accordance with the design formula previously referred to. Based on these tests, a job-mix formula for the particular areas to be mixed was established within the specified tolerance. The required percentage of emulsified asphalt varied with sand grading in various areas. It averaged about 8.5%, equivalent to about 5.2 gal, emulsified asphalt per sq. yd. of 6-in. base.

The materials previously windrowed and checked as described above were then mixed with the emulsified asphalt using a traveling plant. Constant check was kept on the linear footage of mixed windrows for each 1,000 gal. of emulsion. This enabled the field inspector to pick up any variations in the field mix as compared to the job.

Moisture Conditions Varied Widely

Because of changing weather conditions, the moisture content in the windrows varied between wide limits. Emulsified asphalt, because of its water content as a carrying agent, is readily missible with aggregates of any moisture content. Therefore, this type of bituminous material was particularly adaptable for the sand aggregate used at Ballston Spa during various conditions of weather, which was both wet and dry and cold and warm. Windrows prepared at approximately the same time and subject to the same weather conditions carried uniform moisture content.

In the early fall when moisture content of windrows was high, the percentage of emulsion was held to the low side of specification requirements. This was done to hold down the percentage of moisture in the finished mix and to facilitate curing operations. Curing was accelerated by adding 0.5% portland cement to the mix following addition of emulsion. The only function of the cement was to lessen the curing time by more rapid breaking and dehydration of the emulsion. If the percentage of moisture in the windrows was sufficiently low to result in too dry a mix, a minimum controlled percentage of water was added, using water pumps on the mixer coordinated with the flow of emulsion.

Samples Tested for Bitumen, Stability

The processed material was deposited in a neat triangular windrow behind the traveling plant. Samples of mixed material were taken at regular intervals, and extraction tests made as an added precaution in controlling bitumen content. Mix samples were also tested for stability in accordance with the Modified Florida Bearing Value method of test, as described in the report on soil-emulsified asphalt and sand-emulsified asphalt pavement, Proceedings, 21st Annual Meeting, Highway Research Board, Dec., 1941.

All mixture samples tested well over the 100-lb. bearing value normally considered the minimum requirement. Only five samples were under 150 lb., and 90% of all samples tested 160 lb. plus, or capacity of the testing machine.

Difficulty with Layer Compaction

It had been anticipated that the surface course on the earlier base construction would be placed in the fall of 1942. In order to speed the drying period, the processed material was spread by blade graders in exceptionally thin layers, and each layer was compacted thoroughly with rubber-tired rollers. Although this method accomplished the desired purpose, it did have some objectionable features for this particular job.

During late fall, strong winds were prevalent and considerable uncoated sand, blown in dust clouds, was deposited on the areas being compacted, as well as on and behind windrows. The erection of a snow fence relieved this condition but did not cure it.

Improved base method. Sand-emulsion mix was spread full 6-in. depth about to grade, and initially compacted with rubber-tired roller

The combination of blow sand and manipulation and rolling with rubber-tired rollers resulted in a tendency to strip the asphalt coating from the top particles of each layer placed, resulting in lamination between the compacted layers. This condition, however, was completely eliminated by using a sheepsfoot roller to punch into the surface of each layer prior to the spreading and compaction of the successive layer.

Though this method of spreading and compacting was found satisfactory, operations were facilitated and better compaction obtained by breaking down the windrows of mixed material as scon as possible after mixing, spreading and rolling the emulsified asphalt sand mixture to the full depth of the base as a continuous operation. Rolling with rubber-tired rollers progressed as the windrows were broken down and spread with blade graders.

When the full depth of the mixture was spread, rolling with the rubber-tired rollers was continued, supplemented by sheepsfoot and tandem rollers. During the rolling use of blade graders was continued in conjunction with two rubber-tired rollers, one sheepsfoot and two 10-ton tandem rollers, in order to maintain uniform grade and cross-section.

Securing Final Compaction

These combined operations assisted in dehydration of water from the mixture as well as in compaction. Final and maximum compaction was secured by the addition of two 12-ton, three-wheeled rollers used in conjunction with the tandem and sheepsfoot rollers. The ridges left by the three-wheeled rollers were smoothed out by cross rolling with the tandems, but the marks of the sheepsfoot roller were purposely left to help key the surface course.

This method of construction of the base course was particularly well adapted to the project because the sand subgrade prevented any capillary action during compaction and curing. Under normal weather conditions the operations as described resulted in complete compaction and a decrease of moisture content of the base course from 11% down to 3% in three days.

The following results, on comparative densities of representative samples of the two methods of spreading and compacting, were obtained by tests cores from the base course. Tests were in accordance with the Proctor Density Test Method. Samples No. 1 to 4 were taken from the area which was spread, compacted and cured in 2-in. (approx.) layers. with surface

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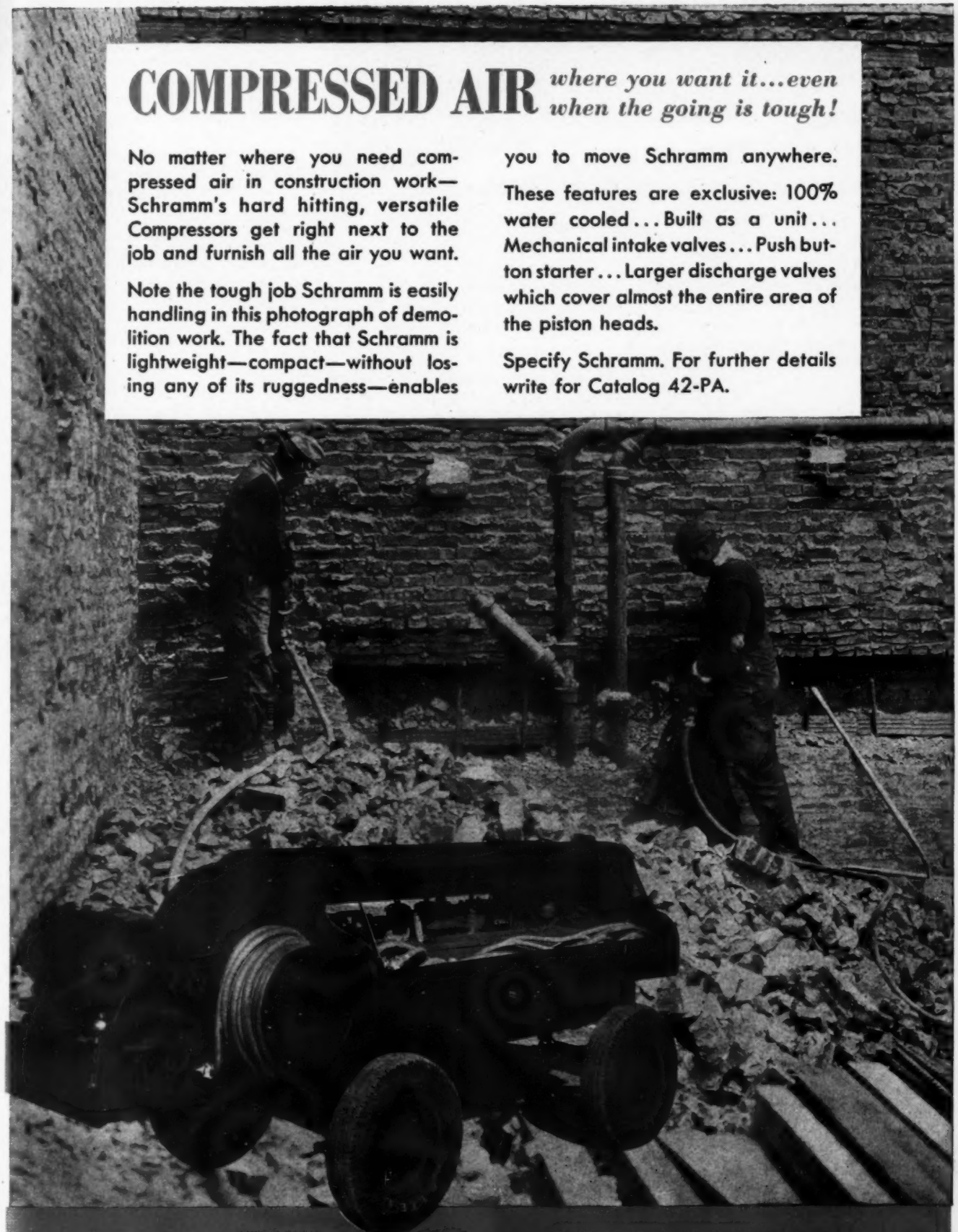

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Mass rolling of base course

reworked and rolled with sheepsfoot and three-wheeled rollers. Samples No. 5 to 10 were taken from the area where the full 6-in. base course was spread and rolled in one continuous operation immediately following mixing.

Sample No.	% Moisture	Field Density (#/cu. ft.)	Lab. Density (#/cu. ft.)
1.....	3.20	105.5	122.0
2.....	4.06	104.9	127.9
3.....	3.63	104.0	120.5
4.....	4.17	109.3	128.0
5.....	1.40	112.7	115.9
6.....	1.80	115.6	118.86
7.....	2.51	110.4	119.23
8.....	2.58	115.9	119.23
9.....	1.56	116.7	117.99
10.....	1.99	120.2	122.69

It is generally accepted that pavements having maximum obtainable density of the materials used have maximum obtainable stability. These density tests are conclusive evidence of the efficiency of the laboratory and engineering control of the base construction.

Surface Course Procedure

The surface course phase of construction took place during the warm summer of 1943. Specifications required the use of a standard cold mix, weight-controlled batching plant. Just prior to start of mixing operations, the central mixing plant which the contractors had planned to use was taken by the Army for military purposes. Since this was the only plant of its type in the Ballston Spa area, and in order to keep the project going, the continuous mixer employed on the base course was set up as a central plant for processing the surface-mix. This required the change from weight to volumetric control. The contractor, however, was required to maintain the efficiency of control of the job-mix formula as specified for central plant-mix.

The plant was set up at a quarry 3½ miles from the center of the airport. Fine and coarse aggregates were stockpiled separately and loaded by crane into a 2-compartment batch bin. This bin was an old-style New York State volume-type concrete aggregate batch plant from which the gates were removed. The aggregates were fed to the converted mixer by gravity. Volumetric control was secured by means of a vertical adjustable partition in the mixer bin, permitting a uniform flow of the proper quantity of each aggregate directly on the apron feeder.

Aggregate Control

The stock piles were sampled and screen analyses were made of the surface-coarse aggregates to determine the job-mix quantities of aggregates and emulsified asphalt, in accordance with the design specified. About 60% stone sand (limestone dust and screenings) and 40% crushed limestone (⅝" to ¼") with 10% emulsion (6% bitumen) were used.

Check tests were made on aggregates from time to time in order to make any necessary slight adjustments in the job-mix. Samples of the mixed material were also taken and bitumen extraction tests and sieve analyses made to further maintain control within specified limits.

Excess Moisture Removed by Preheating

In addition to having proper design and control of the mix, insofar as quantities of aggregates and bitumen are concerned for this type of surface course, it is also necessary to produce a mixture of uniform consistency. This can only be done by controlling moisture content of mix. The method necessarily varies with different aggregates and their moisture content.

When aggregates are very dry, a small controlled quantity of water can be added to the mix to get proper consistency. When aggregates contain a high percentage of moisture (as was the case here), control methods are employed to reduce percentage of moisture in the finished mix. Methods sometimes used for this purpose are (1) application of heat through blow torches on the aggregate as it flows to the mixer, or (2) addition of 0.5% to 1.0% Portland cement or hydrated lime. On this job the contractor elected to preheat the emulsion, and vary the time of mixing by adjustments of the mixing plant.

Placing Surface Course

Immediately prior to laying the surface course, the base was primed with 0.2 gal. per sq. yd. of emulsified asphalt, previously diluted with an equal volume of water to get complete and uniform coverage of any loose or uncoated particles on the surface of the base, and at the same time prevent an excess of bitumen. The emulsified-asphalt, dense-aggregate surface mixture was delivered to the runways by means of a fleet of eight 6-ton dump trucks and spread with a black top spreader.

It was necessary that the consistency (as referred to in the discussion of mix control) be wet enough to permit easy, uniform dumping and spreading, yet sufficiently dry to support the two rollers which carried the rear end of the black-top paver. These rollers naturally compressed the area of the cold emulsion mix over which they passed, leaving a loose uncompacted strip in the center of the lane.

Also, it was necessary to get uniform initial compaction of the full lane width, in order to maintain uniform texture, close the upper voids and eliminate the possibility of words being filled with blow sand. A 10-ton tandem roller was too heavy, and a sufficiently light tandem roller was not available.

Showing completed base course. Marks of sheepsfoot, partly rolled out, helped key wearing surface

New Clutch for Shovels and Cranes

The Fawick Airflex principle—Power Controlled by Air—eliminates all levers, arms and toggles, absorbs shocks and vibration, requires few adjustments and no lubrication. Maintenance costs are unusually low.

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The Fawick Airflex Clutch has proved its ability "to take it" in the hardest clutch service of all—naval vessels where instant maneuverability and positive control of drive means the difference between safety and disaster.

With this unmatched performance record, this clutch is fast becoming standard equipment for all types of heavy-duty machinery drives—on paper mills, rubber mills, hoists, cranes and drags, road machinery, oilfield drilling rigs, heavy presses and shears.

Where the going is toughest—where positive, trouble-free clutch service is a "must"—the Fawick Airflex Clutch is daily making new records for reliability and economy.

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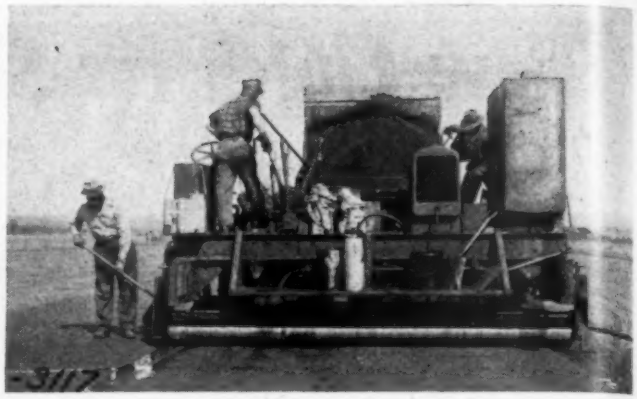
FAWICK *Airflex* CLUTCH
POWER CONTROLLED BY AIR



(Left): Close-up of continuous mixer set up as central plant. (Right): Showing spreader with welded auxiliary roller, spreading emulsified asphalt surface mix

3rd Roller Support Under Spreader

The contractor ingeniously welded a third roller to the rear of the spreader, which helped obtain uniform initial compaction of the full width of the lane and close the surface voids. A water tank and spray bars with adequate control valves, similar to attachments commonly found on power rollers, were mounted on the spreader.

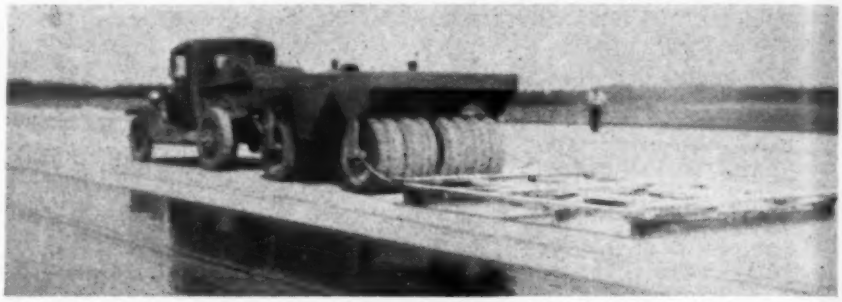
Initial compaction was increased and irregularities left by the spreader were ironed out by rolling lightly with a rubber-tired roller immediately following the spreading operation. Faulty longitudinal joints were avoided by rolling down the outside edges of each strip laid. This resulted in a 45° bevelled lap joint when adjacent lanes of the surface mix were placed. Results of this operation exceeded expectations, and joints could be noticed only by a slight variation in color due to different drying periods of the adjacent strips.

Final surface compaction was obtained by rolling with the 10-ton tandem. The proper time of all rolling for maximum final compaction, as well as other rolling operations, was determined by trial. By following this procedure, a uniformly dense surface course having maximum density was secured.

Seal Coat to Two Specifications

Asphalt Cutback RC-2 was specified in accordance with the CAA Standard for Seal Coat in force at time specifications for this project were written. For the greater portion of the surface RC2 was used. However, CAA Standard Specification P-604 for Seal Coat was revised to permit the use of a quick-setting high-viscosity emulsion. Therefore, a portion of the surface was sealed with this type of material.

Following the application of the bituminous seal, the surface was covered with 10 to 12 lb. limestone sand, 100% passing ¼ in. The cover aggregate was distributed by rotary chip spreaders mounted on the rear of trucks operating backwards. The surface was rolled with a rubber-tired roller having a broom drag, attached to insure uniform distribution of cover, and with 10-ton steel-wheeled tandem rollers. Following complete curing of the seal, excess cover aggregate was removed by standard city street sweepers with pick-up (gutter snipe) attachments and again rolled with the steel-wheeled tandems. The resulting surface has a uniform sandpaper appearance with no indication of joints or other irregularities.

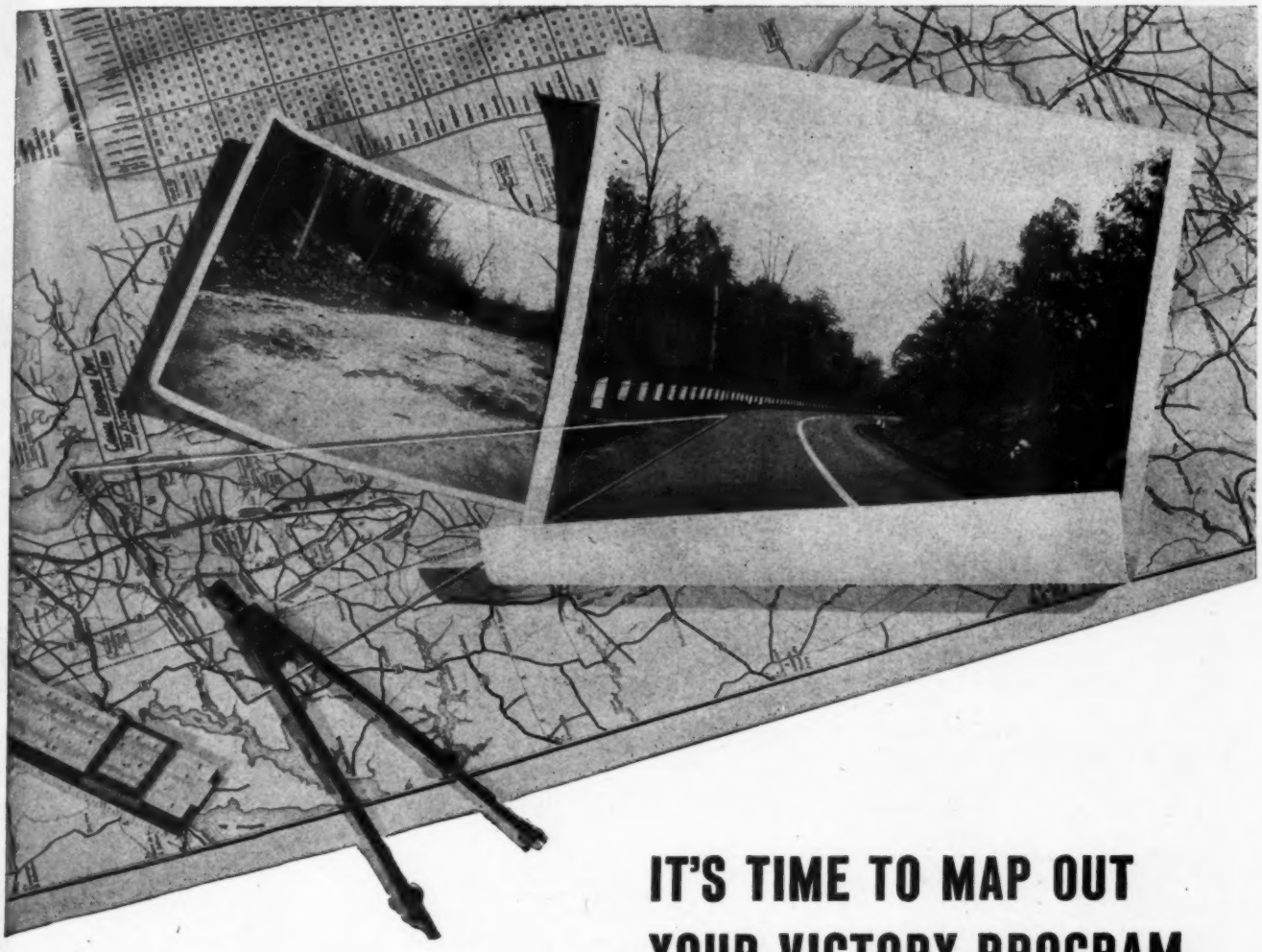


Seal with cover aggregate being spread and rolled with a roller designed and built by the contractor. The finished pavement was notably free of joint marks or other surface blemishes

Field Engineer and Contractor Get Special Citation

The successful completion of the pavement in accordance with the design and intent of the plans and specifications, was due to the wholehearted cooperation of the project engineer and his assistants and of the contractor. The project engineer kept in close contact with all operations, and coordinated the many details of control involved in securing the desired results. He administered the job in such a way as to get the complete cooperation of both his own forces and the forces of the contractors. Mr. Kellam, of the contracting firm, who is an inventive and ingenious administrator, was in constant contact with the work, devising plans for economical and speedy construction while at the same time cooperating with the engineers to carry out their instructions and doing his part toward the construction of a high-quality pavement.

Rolling surface directly behind spreader



IT'S TIME TO MAP OUT YOUR VICTORY PROGRAM

IN THE new era of transportation that will be demanded after this war is won, the first responsibility of enlightened highway planners will be the construction, maintenance and repair of local or feeder roads. These secondary roads are not only essential for efficient local travel, they must also furnish easy access to and from the great primary routes—by land, by sea and by air.

Providing them—quickly and in sufficient volume—will give America's highway officials the greatest construction job of all time.

It's none too soon to consider your own part in the Victory picture—your own post-war plans.

Why not talk them over with the Tarvia field man? He has at his command all Barrett's 40 years of successful paving experience. He can show you how you can use Tarvia with local materials and local labor to get the most miles of smooth, easy-riding, skid-safe road from the appropriation available. He can prescribe the right grade of Tarvia and the right Tarvia method for almost any type of pavement—to satisfy almost any traffic requirement.

Phone, wire or write our nearest office—and ask the Tarvia field man to call, soon.

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Macon County, Illinois, Planning Sensibly for the Future

By ALAN N. BUCK
Superintendent, Macon County Department of Highways, Decatur, Ill.

IN our opinion the terms "post war plans" are much overworked. We like to regard the present situation as merely an interim in normal construction. And, since we have always operated on a planned basis, the present war situation that prohibits construction is just a period during which we are conserving our normal revenue and, as far as man power permits, are making surveys, drawing plans, and preparing specifications.

Therefore, our situation today is as follows: We are working on the theory that local improvements should be financed 100% locally and, if we can not afford this or that job, we don't intend to build it. Our program, as always, is based on our normal local revenue. We are not planning some large idea with the thought that a federal Santa Claus is going to make large and unreasonable handouts. Hence, we feel that our program includes those jobs that are necessary. They can be paid for locally without going into large bond issues or debts, and they are the jobs that ourselves and neighbors desire to have and are prepared to pay cash for.

So much for the general situation. Definitely, we have 6 jobs totaling $350,000 on which we are ready to take bids. We have 3 more jobs on which surveys are made, and we are now working on plans and specifications. We have 26 other jobs which are in the preliminary stages only.

This program has been worked out first with our Regional Planning Commission and it is so scheduled that based on our local normal revenue will take 11 years to complete. Our normal local revenue is about $150,000 per annum for construction and we now have about $300,000 available from revenues accumulated because of no construction during the war.

We have been able to keep up our maintenance satisfactorily so our programed construction consists of additional improvements. For this county, that consists of grading and surfacing, together with drainage structures to be built to standards deemed satisfactory. This 11-year program will provide all-weather, dustless surface on grades of recognized engineering standards on the complete county system of 275 miles. At present, 110 miles are so improved. The 11-year program also includes a railroad grade separation, two bridges of about 450 feet in length, and an outer belt line around Decatur, Ill., which intersects the 9 radial state and federal highways serving this city of about 65,000 people.

While there is nothing spectacular in this program, we believe it is sensibly planned both as to financing and engineering, it will be executed 100% by the contract method, it will be financed 100% by local revenues, and a large part of it is ready to go when war time restrictions are removed.

▼

Writes F. P. G. Halbfass, Muscatine County Engineer, Muscatine, Ia.:

I am listing below some facts regarding Muscatine County's post war planning:

Projects	Estimated Cost	Status of Plans
Bridges and Culverts.....	$18,000	Completed ..... 10% Under Way .....100% To be completed during 1944.....100%
	(50% of this sum for pipe and culverts)	
Grading—23 mi.....	$33,300	Completed ..... 35% Under Way .....100% To be completed during 1944.....100%
Surfacing—34½ mi..... (Comprised of gravel and stone 10 mi. Stabilized bases and black top 10½ mi.)	$77,721	Completed ..... 50% Under Way .....100% To be completed during 1944.....100%

Funds for this work are either now available, or will become so during 1944. We now have $83,635 reserved in the Construction Fund for work that normally would have been completed at the end of 1943 and at the end of this year expect to reserve the balance necessary to complete the above pledged projects.

At present many of our gravel and rock-surfaced roads need resurfacing, because the gravel plants were furnishing their entire output to the construction of war plants and the rock quarry worked at capacity producing agricultural limestone. We are at this time in need of 26,000 cu. yd. of resurfacing material, which we expect to pay for with maintenance funds.

We are not undertaking anything spectacular, but are using every means at hand to protect the investment in highways and bridges and keep the roads in good travelable condition. We are located in rich agricultural area and it is important that crops get to market. To date such efforts have been successful.

▼

From Bexar County, Texas, W. F. Pickard, county highway engineer, San Antonio:

Surveys have been completed on two projects in particular, and as two projects in particular, and as time avails itself design and planning are progressing. Projects to cost $265,000.

Bexar County's total of beneficial post-war projects would cost $1,277,000. However, this expenditure is more or less of a fantastic idea. Probably the most important projects included would be the rehabilitation of existing county paved roads, which are all-important farm-to-market highways, and are very inadequate to handle present day traffic, having been constructed around 1925 and 1926. These projects on these old roads, however, do not require a whole lot of planning, inasmuch as what would probably be within reach of the county finances would be just a matter of widening the present pavement, seal coating to provide adequate widths, and possibly eliminating sharp turns.

▼

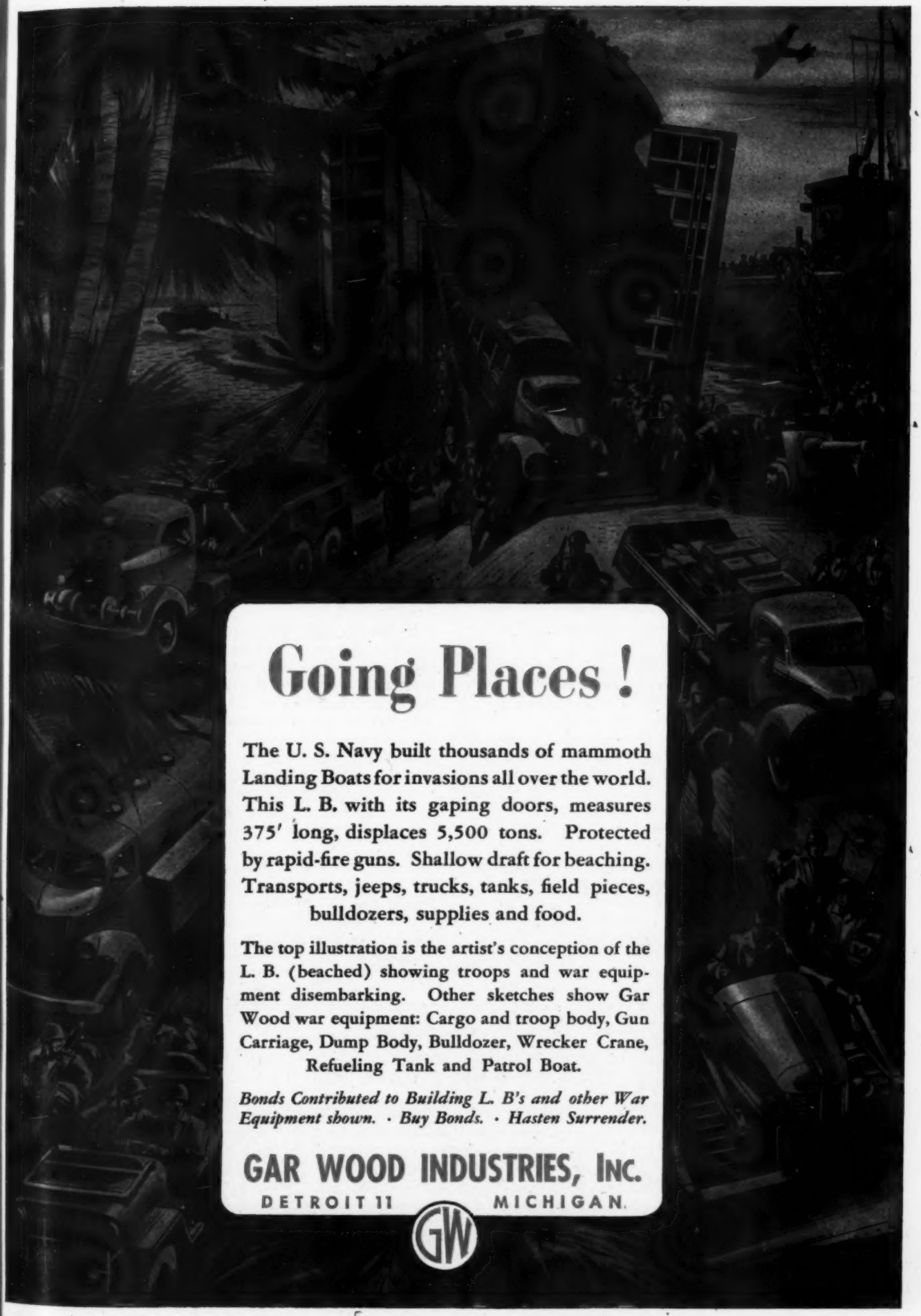
From J. C. Morris, director of public works, Warwick County, Hilton Village, Va.:

Our post-war plans consists of a major drainage system in which new culverts are to be installed and ditches and canals excavated. We also are badly in need of some storm sewers and also curb and gutter projects in a number of the new sub-divisions.

We will be in a position under our post-war program already planned to work a tremendous number of men provided funds are available for such work.

Frankly, we are also concerned with our present road program very much, due to the reduced revenue for road work as a result of gasoline rationing, and being located in this Hampton Roads Area in which section 19 new residential sub-divisions have been built since the war began. This has created a tremendous increase in road mileage. Likewise the volume of traffic on our roads has increased considerably due to the local war effort.

Drainage is also a major problem and with the labor shortage it has been impossible for us to do the drainage work necessary to protect our roads.



Going Places !

The U. S. Navy built thousands of mammoth Landing Boats for invasions all over the world. This L. B. with its gaping doors, measures 375′ long, displaces 5,500 tons. Protected by rapid-fire guns. Shallow draft for beaching. Transports, jeeps, trucks, tanks, field pieces, bulldozers, supplies and food.

The top illustration is the artist's conception of the L. B. (beached) showing troops and war equipment disembarking. Other sketches show Gar Wood war equipment: Cargo and troop body, Gun Carriage, Dump Body, Bulldozer, Wrecker Crane, Refueling Tank and Patrol Boat.

Bonds Contributed to Building L. B's and other War Equipment shown. · Buy Bonds. · Hasten Surrender.

GAR WOOD INDUSTRIES, INC.

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GW

Editorial

THE CONTRACT SYSTEM

THREADED through all the highway conventions this winter was an under-current of concern over what might happen to the competitive contract system of doing business in the post-war period.

The reason this matter is so vital, of course, is that contract construction is a form of private enterprise, with emphasis on the word enterprise, on which American life is built. In the construction industry the alternative is another WPA at the worst, and the inherent inefficiency of force-account work at best. Construction, with its uncertainties, is peculiarly fitted to the "risk-reward" idea by which human beings are sharpened and stimulated to greatest effort.

Is the contract way the most economical? At the recent ARBA convention a committee of the Highway Contractors' Division under A. E. O'Brien and Charles W. Smith, reviewed data on the basic economy of doing road construction by private competitive contract.

Through cooperation of the Highway Research Board, a report was submitted which gives tangible proof of the economy of contract effort. A state department and PRA survey of several years ago was analyzed to determine the relative economy and efficiency of contract and day labor work. Quoting the Commissioner of Public Roads:

A survey of 53 sections of highway of various types of construction in 46 states, involving 244 miles, showed that on the 53 projects there was an 18% average difference between the cost of force account and the bid prices—18% saving by the contract system. On 75% of the projects or 176 miles, the average difference was 31%.

On 25% or 68 miles, the bid prices were higher than day labor costs by 10%. However, all contractor cost items also included such factors as taxes.

The survey is conclusive proof of the advantage of competitive methods. During the thirties, $4,200,000,000 of government funds were spent by WPA on highway construction without competitive bidding. Applying the 18% savings, contract methods would have saved $756,000,000 or enough to finance most of the federal and state highway construction and maintenance program for a year.

The ARBA Contractors' Division has rendered a service in spotlighting these data and also in underscoring the five basic advantages of contract work:

1. The awarding authority knows before-hand the amount the job will cost and whether it meets his available funds or estimates. This definite price is guaranteed by a surety bond.

2. The contract system is the cheaper way to handle public works.

3. Experience has been that contract work is completed in one-third to one-half the time required by WPA or any other force account method. (Time is money, speed often of special importance.)

4. Quality of work is guaranteed because of the rigid inspection under which contractors work.

5. The contract system, operating under standard specifications, tends to standardize construction methods and types. A large percentage of force-account work is done without adequate plans and specifications; when plans are available, they are very rarely strictly lived up to.

It follows that state, county and municipal officials who give the public the most for its construction dollar are those who hold force-account work to a bare minimum and encourage the development of efficient contracting organizations. As Indiana's Sam C. Hadden, AASHO president, said recently, "I'll venture that not a single responsible state highway official would think of turning his back on this time-tried system. In Indiana we're broadening contract work this year to include patching and surface treatment. Our highway department would be unable to discharge its obligation without a large number of contracting firms."

More cases showing savings in contract work should be dug out of project files and made public. In the meantime, the most potent weapon against a return of WPA is to *hasten plans preparation now*, confining to the simpler projects when engineering personnel is lacking.

ARBA Conference

(*Continued from page* 48)

by the contract method; Resolved that ARBA recommend passage of federal legislation to provide for (1) the extension of federal highway aid to cities; (2) the apportionment of such aid to through state highway departments to cities of 10,000 or over by an equitable formula; (3) cities to make surveys and plans, enter into contracts and supervise construction.

On Easement of Restrictions on road construction, repair and maintenance: That WPB be urged to issue a conservation order pertaining exclusively to the maintenance, repair and construction of roads and streets; the order to amend and liberalize L-41 so that officials may carry on work, within designated limits, without getting permission to initiate individual programs or projects.

C. W. Brown Again Pres.

Missouri's highway chief, C. W. Brown, will head ARBA again in 1944. E. R. Galvin, sales manager of R. G. LeTourneau, Inc., was elected vice-president, central district, to fill vacancy from death of Lion Gardner. Continuing as vice-presidents are Paul B. Reinhold, Atlas Equipment Co., Pittsburgh; Charles W. Smith, Smith Engineering & Const. Co., Pensacola, Fla.; and Robert A. Allen, state highway engineer of Nevada, Carson City. H. C. Whitehurst, director of highways, Dist. of Columbia, was re-elected treasurer.

(*Continued to page* 95)

They practice what they preach

Here in the oil fields, operators talk and produce in terms of thousands of barrels. But when it comes to consumption of these vital stores of petroleum—then these same men are just like any "A" book holder down to his last coupon.

This vigilance against waste is not just a war expediency. It began long before the hooked cross spread its tentacles over the world . . . and its beginning was marked by the introduction of Cummins Diesel Power in the oil fields because it was found to be "Faster and Cheaper than Steam."

Today, in every major producing area, Cummins Dependable Diesels are in the forefront of the petroleum industry's fight to achieve maximum production with maximum economy . . . not only economy in the consumption of fuels and lubricants, but also economy of time, materials and manpower.

Here, truly, is a demonstration of conservation . . . here is an example of men in industry who *practice what they preach!*
CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fourth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Dependable Diesels, you can assure their most effective use by making doubly sure that they are maintained and serviced—regularly and efficiently. Ask your Cummins Dealer for details.

The side-arm ears can be placed between the mouldboard ears at several different points for adjusting tilt at various angles.

End Tilt Adjustment quickly and easily made

...another of the many high-efficiency features on the new HEIL

Cable Dozers

for International Harvester TracTracTors

To establish a sloping cut . . . to peel a bank . . . to maintain a level cut when the tracks must travel on a slope . . . it's a simple matter to adjust the end tilt on the Heil Cable Dozer. Here's one more of the many features that assure high efficiency . . . through careful engineering which has accomplished perfect teamwork between tractor and dozer all along the line.

You can depend on Heil Cable Dozers to give you *positive* action . . . *smooth* performance . . . *full* visibility . . . and require *minimum* maintenance.

To get jobs done faster . . . and at a profit, investigate the possibilities of Heil Cable Dozers now.

Send for bulletin.

R-21

SEE YOUR INTERNATIONAL TRACTRACTOR DEALER

ARMY NAVY

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

Used Const. Machinery Tax

Sellers of used construction machinery need not pay Federal income normal and surtax rate on any part of the profit made in such sales, under certain specified conditions. This point is clarified by Henry M. Hale, director of the Construction Machinery Division, in a statement to contractors and others having used construction machinery for sale.

"Draglines, shovels, cranes and tractors are urgently needed in this country and abroad for coal and ore mining, lumber and food production, and for industrial plants," Mr. Hale stated. "Since new equipment is not available, the Construction Machinery Division must assist in locating suitable used equipment to keep such essential production in operation. In many cases, however, owners are reluctant to sell their idle equipment because of the tax which they believe they will have to pay on gains from such sales."

Section 117 (j) and related sections of the Internal Revenue Code, as amended in 1942, and regulations of the Internal Revenue Bureau, provide tax relief directly applicable in this situation.

Clarification of this point is made by Mr. Hale in the following statement, which has been approved by W. T. Sherwood, Acting Deputy Commissioner, Bur. of Internal Revenue:

"If you own and use construction machinery in your trade or business; if this machinery is subject to the allowance for depreciation; if you have held this machinery for more than six months; if the machinery is not of a kind which you would include in your inventory on hand at the close of the taxable year; if this machinery is not held by you primarily for sale to customers in the ordinary course of business; and if you sell this machinery and realize a gain subject to Federal income tax; then:

"Instead of paying your normal and surtax rate on any part of this gain, you can treat it as a capital gain and pay an alternative tax on the excess of all such gains over capital losses if it is to your advantage to do so. The alternative tax rate is 25 per cent for corporations. It is 50 per cent for individuals but only 50 per cent of the actual gain is taken into account in the case of individuals.

"In other words, the most you can be required to pay in any event in Federal income taxes on the total gain from the sale of your machinery is 25 per cent of the gain.

"For details, check your individual case with your tax consultant or any Collector of Internal Revenue."

Regulation for Rental Charges for Dump Trucks Changed

Two principal changes in the regulation establishing rental charges for dump trucks used in construction or road maintenance work were announced Feb. 1 by OPA.

The changes do not affect hourly rental rates already established. They are designed to define more clearly the intended coverage of the regulation, and to eliminate the burden of filing computed charges with OPA for approval when dump trucks are leased by owners to contractors who furnish their own drivers.

Rental rates apply only to dump trucks when primarily used in "off-the-highway" construction or road maintenance work. They take into consideration the severe use justifying a higher rate than for the ordinary hauling on a solid roadbed.

The regulation does not apply to employment of dump trucks for point-to-point transportation of materials, and other "on-the-highway" tasks. Rental for dump trucks used in regular highway hauling is established under the provisions of Maximum Price Regulation No. 165 (Services) or the General Maximum Price Regulation.

Lessors are now permitted to rent fully maintained trucks to contractors who furnish their own drivers at an established schedule of dollars-and-cents rates, according to the capacity of the trucks. This makes filing with OPA unnecessary.

Additional changes in the regulation are:

1. The capacity of any dump truck shall be the water level capacity as determined by the height of the tail gate or front end (whichever is lower) of the permanent truck body, and when necessary to attain such water level the sides of the truck are brought up to this height by temporary or permanent sideboards.

2. The capacity of a "Boulder type" truck, one designed without a tail gate for hauling big rocks, is determined by mfrs.' rating.

3. Monthly increments allowed dealers for storing and maintaining vehicles pending sales may not be used in determining the value of trucks for computing rental charges.

(Amendment No. 14 to Maximum Price Regulation No. 134—Construction and Road Maintenance Equipment Rental Prices and Operating of Maintenance Service Charges—effective Feb. 5, 1944.)

You move more dirt per hour at less expense... with

HEIL CABLE SCRAPERS

1 LOAD FASTER because of the rapid raising and lowering of the cutting bit, made possible by the fulcrum-type lift.

2 MORE YARDS OF DIRT with a given output of tractor horsepower, because the bowl fits the load without extra digging time.

3 ECONOMICAL HANDLING because the speed, flexibility, and scientific weight distribution assure bigger yardage at lower cost.

4 LESS CABLE REPLACEMENT because rope lasts up to four times as long. Many report savings of ¼¢ to ½¢ a yard.

5 FASTER UNLOADING—all the load can be spread smoothly and evenly at high speed — with no sticking in the bowl, even in wet, sticky soils.

CABLE POWER Costs Less

Simple, fast-operating Heil Power Control Units lower operating costs

Smooth-operating brake and clutch assemblies eliminate shocks and jerks; the large drums run cool; the sheaves are designed to reduce wear on cables. This adds up to minimum outlay for cable replacement. Fingertip control gives lightning-fast response for bigger yardage.

...and that isn't all:

Heil engineering gives you all-welded construction; scientifically located draft-pivot point; ample tire clearance; and an all around design that assures you of easier maintenance and simpler field repairs.

Write for descriptive bulletins. R-22

ARMY E NAVY

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GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

1944 Road Upkeep and Repairs—II

Continuing with state highway department reports on arterial road conditions, the outlook for needed repairs and resurfacing, special maintenance problems

New York's Need Has Piled Up for Years

Reports H. D. Schermerhorn, commissioner, New York division of highways:

Highway building and highway reconstruction work have been at a low ebb in New York since 1932. Since Pearl Harbor we have really had no State program for construction or reconstruction and have virtually carried on no contract work except as agent for the federal government in the building of access road projects. In view of the lack of highway activity for 10 or 12 years, naturally the condition of our highway system has deteriorated considerably. We have endeavored to the best of our ability to maintain existing roads in best possible condition.

As an example of how little we have done on the State's initiative, in 1943 we let but one emergency bridge contract. It is useless to attempt putting any work under contract until war conditions change and there is a let-down in federal regulations and highway restrictions.

We have an accumulation of $83,000,000 for highway and parkway construction and reconstruction, but it is not our belief that any of this money will be expended in 1944.

Last year we were given $12,000,000 for general maintenance and repair. Possibly because of lack of reconstruction work, our legislature may become somewhat more generous this year. In 1944 we did extensive patching and surface treatment as a preservative. If we can obtain asphaltic materials we will undoubtedly cover with a mixed bituminous top considerable mileage of old concrete roads with our own forces. We find that this work can be done with a minimum amount of labor. At the same time, it provides sufficient coverage of old concrete roads to carry them along for some time.

During this period of construction inaction we are employing our depleted engineering force to prepare contract plans for post-war use. Whenever that may be, you will find New York State prepared with as large a program of construction and reconstruction work as can actually be carried out with such engineering and contracting personnel as may be procurable at the war's end.

Mud-jacking crew of Colorado state highway department. Mud-jacking will again figure extensively in state highway road repair work in 1944 and principally in connection with under-sealing around joints to eliminate pumping

California: $5,000,000 for Heavy Repairs

Word from G. T. McCoy, California state highway engineer:

An estimated 2,500 miles of California State highways will require extensive surface restoration treatment immediately following the war, involving some $46,000,000. In the interim, it will be necessary to expend annually some $5,000,000 for heavy surface repairs, exclusive of general maintenance, in order to carry our major highways over.

Proposed for the 1944 calendar year:

	Miles	
	Traveled Way	Shoulders
Seal coat	1,000	200
Light and heavy patching blankets	550	...
Retreatment of existing surfacing	400	100
Base reinforcement	35	...

Cost to be about $5,000,000, about ¾ to be done by contract. General maintenance during this period will involve an additional $10,000,000.

Our principal concern has been the loss of personnel to the armed forces and war industry, and were it not for the mildness of the past winter, many of our main highways would have been closed due to this shortage of both skilled and unskilled labor. The equipment situation is likewise becoming increasingly difficult, due to our inability to secure replacements of obsolete equipment, as well as the loss of our outside private rental source which formerly supplied peak needs, amounting to 30% of total rentals.

Colorado Will Work on 1400 Miles

From D. N. Stewart, Superintendent of Maintenance, Colorado state highway dept.:

No particularly needed road repair jobs were carried from 1943 to 1944. However, inasmuch as we have about 4,000 miles of bituminous surface highways, needing a new seal at least every 3 years under heavy traffic and every 4 to 6 years under lighter use, we should seal about 1,000 miles annually. Due to worker shortage, difficulty in obtaining sufficient cutbacks (held up for tank cars), we only sealed 760 miles last year, or about 250 miles short of our yearly average.

372 miles will need heavy repairs in 1944; 974 miles will need resurfacing; 50 miles should be entirely reconstructed.

As to funds, the 1944 submitted budget calls for expenditure of $2,217,000 (plus carry-over) for maintenance, maintenance equipment, maintenance repairs.

Our big problem in Colorado is the fact that by proclamation all statute weight and length restrictions have been suspended; and, over-weight loads many of them with axle loads up to 24,000 lb., are doing tremendous damage. It is a grave question whether, with our limited forces, limited funds, and equipment, we will be able to keep up with the repair of this damage during 1944.

1,450 Miles Sealing in Kansas

From R. C. Keeling, State Highway Engineer, Kansas:

Due to restrictions, we see accumu-

lating a great deal of needed maintenance and repair work. In normal years new construction amounted to $10,000,000 annually. In reality this was mostly reconstruction to present-day standards. While we feel that, in general, we have been able to hold our surfaces to fair conditions, many old surfaces are deteriorating and making necessary more heavy maintenance. This is especially true of some of our old concrete and brick pavements.

During 1943 we sealed 1,456 miles of our 5,000 miles of bituminous surfaces at cost of $1,073,000. Sealing consisted of applying .25 to .3 gal. cutback or penetration asphalt and covering with sand-gravel, chats or crushed stone. About the same mileage will require sealing in 1944. About 854 miles of aggregate-surfaced roads required resurfacing with gravel or crushed stone in 1943; same requirement in 1944. It is expected that most of this work will be let by contract as in 1943.

Very little entire reconstruction will be required in 1944 as a military necessity, perhaps 50 mi. Tentative plans are also being made to resurface a limited mileage of concrete and brick, probably by placing 1 to 1½ in. bituminous mat.

It is anticipated that sufficient funds will be available for necessary work in 1944. Expenditures: probably about the same as last year.

We have put much stress on surface maintenance, eliminating or curtailing the mowing, ditch and erosion work, etc.

In general, our roads are going into 1944 in fair surface condition but we anticipate many break-ups in places which we repaired last year but were unable to reconstruct to needed present day standards.

Extensive Resurfacing in Wisconsin

From E. L. Roettiger, state highway engineer, Wisconsin:

As a result of several years' maintenance curtailment we face a situation where the load carrying ability of many of our roads is reduced to the point of requiring heavy or constructive maintenance in the form of resurfacing. At this time we estimate the urgently needed work in this class as

	Miles
Light gravel and stone resurface...	1,080
Heavy gravel and stone resurface...	610
Bituminous mat resurface on pavement	534

Our maintenance operations for the preservation of deteriorated pavements consists primarily of bituminous blanketing. Production and furnishing of aggregates is generally performed by contract and the application of bituminous material and manipulation and placing of mixers is done with departmental forces.

The maintenance program for 1944 will depend to a large extent on the availability of men and materials. It is not inconceivable that under conditions of a severe spring breakup all available personnel would be required for basic restoration of damage and require a substantial part of the ordinary working season when maintenance operations can be performed. We do, however, at this time estimate our desirable and needed 1944 maintenance program about as follows:

	Miles	
General patrol maintenance	10,000	$2,000,000
Heavy bituminous mat resurface	500	1,600,000
Light bituminous mats and resurface treatments	800	700,000
Aggregate resurfacing ..	600	1,300,000
Seal coats	390	250,000
Heavy pavement and bridge repairs		180,000
Total		$6,030,000

Illinois to Resurface 258 Miles, Fix 800 Miles Shoulders

From W. W. Polk, chief highway engineer, Illinois:

Special attention has been given to the traveled way during the past year, with result that there is an accumulation of shoulder reshaping and ditch work. We have carried over some 600 to 800 miles of such work.

Our tentative 1944 program contemplates bituminous resurfacing of about 258 miles during 1944. Patching program will be very seriously reduced, and such patching as will be found urgent will be carried out primarily by maintenance forces.

Our chief pavement treatment will be bituminous resurfacing. Contractors will be offered most of this work. $7,350,000 has been set up for maintenance of highways in 1944.

The chief problems of preserving roads for wartime traffic are not found in financing but rather in obtaining the necessary authority from the War Production Board to proceed with the work, obtaining priorties for material and equipment repairs, and adequate labor to carry on the work. Labor shortage will show up particularly in the case of prolonged snow fighting operations when drifting of snow will frequently block highways.

N. C. Need Piling Up

From W. Vance Baise, state highway engineer of North Carolina:

Prior to the war this Commission was spending $5,000,000 to $7,000,000 or more State funds annually for maintenance and betterments, on the State and County roads, than spent at present time. This was in addition to considerable benefit from WPA in improvement which reduced immediate maintenance.

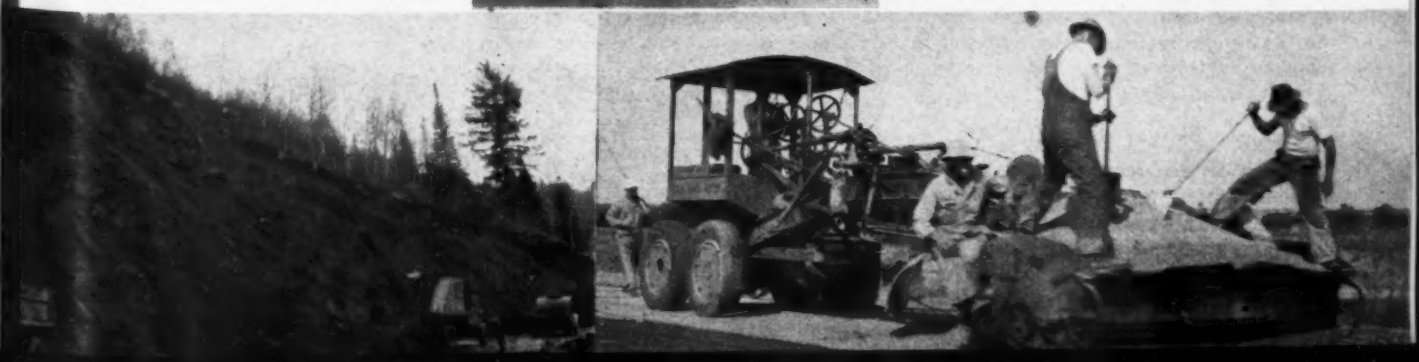
During 1942 and 1943 we only resurfaced 650 and 1,150 of bituminous roads, whereas, prior to the war, we averaged resurfacing 2,000 miles or more. This State has about 8,600 miles of bituminous roads, mostly on stabilized base with bituminous treatment. On this construction it is necessary to retreat every 3 to 5 years.

In 1944 trunk lines will require much greater maintenance than in the

Nature will send along her usual annual quota of many hundreds of big and little slides along the country's roads in 1944. This one is on Rabbit Ears Pass, Colo.

(Left): A typical edge patch, necessitated on this Colorado road by breaking down of pavement edge by over-weight trucks

(Below): Seal coating and other maintenance will have to be done extensively with understaffed crews. Lucky is the department which has mechanical spreaders and other labor saving devices



past, due to more concentrated truck traffic and increased age. Many of the roads have now reached the age where deterioration is accelerated. A small trunk mileage will require heavy repair; several hundred miles, resurfacing. Various sections are failing very rapidly, resulting in almost constant patching of these highways, and will require considerable resurfacing work in order to seal them from the possibility of surface water getting into the subgrade.

Available funds include $4,000,000 for State maintenance (11,500 miles), $7,500,000 for County roads (48,000 miles). $1,000,000 to take care of retreatments of surface treated roads, and $1,000,000 for general betterment work, mostly retreatments.

Older Bituminous Gravel Giving Trouble

From E. H. Parker, engineer of maintenance betterments, Connecticut state highway dept.:

Since Connecticut is in a vital manufacturing area, with all state maintained roads used daily by defense workers and all main routes by military convoys, it is considered necessary to keep all roads in as good repair as possible. Although labor shortage exists and we have experienced difficulty in obtaining material and equipment, in general, light surface treatments, spot patching, drainage repairs and mud-jacking has been performed as usual. However, it was necessary to curtail 20 per cent of our 1943 stone surfacing or "armor coating" program.

About 150 miles should be "armor-coated" in 1944. Heavy repairs such as cross-section improvement should be made on 20 miles. Twelve miles of highway should be reconstructed as a military necessity. Exclusive of snow removal and sanding ice, $2,032,-200 has been approved for surface and shoulder repairs for year July 1, 1943, to June 30, 1944.

Because of the extremely heavy loading of trucks engaged in transporting war supplies, we are having considerable difficulty with some of our older bituminous-treated gravel roads breaking up when the frost is leaving the ground in the Spring. Stabilization of wet subbase is being carried out as far as possible, by installing underdrains. Some experimental work is being attempted with the treatment of frost boils by localized application of calcium chloride to subbase.

Michigan Budget Up $3,000,000

Writes H. C. Coons, deputy commissioner-chief engineer, Michigan state highway department:

Accumulated maintenance and repair needs on our state system include:

250 miles of bituminous surface treatment of existing concrete or bituminous roads; 137 miles of bituminous surface treatment of gravel roads; 110,000 sq. yd. of concrete patching.

By type this will include heavy repair on 40 miles of concrete and 50 miles of blacktop. Resurfacing: bituminous resurfacing of 75 miles of concrete, 125 miles of blacktop, and also 700 miles of gravel resurfacing. Entire reconstruction 15 miles.

Concrete patching and resurfacing, both on concrete and bituminous pavements and gravel will be let out by contract to road contractors. The maintenance budget was set up for the fiscal year ending June 30, 1944, and is $10,500,000—$3,000,000 above normal.

1,700 Miles Need Attention in South Dakota

From E. W. Meeker, State Highway Engineer of S. Dakota:

The greatest accumulation of maintenance needs in this state is that of renewing bituminous surfaces with reseal. About 1,000 miles must be sealed in 1944. Our plan is to use contractors' equipment when we can. In 1942-1943, such equipment was very limited.

We must also resurface at least 500 miles of gravel roads. Other repairs, such as reworking bituminous surfaces, at least on shoulders which have been deteriorating under heavy trucking, will be necessary on about 200 miles of bituminous treated highways.

A maintenance budget of about $3,000,000 will be set up in 1944.

Massachusetts Roads Have Kept Up Well

Report from R. W. Coburn, chief engineer, Massachusetts dept. of public works:

Maintenance work on Massachusetts roads surfaces has not suffered severely. About 7 miles of state roads will need heavy repairs or resurfacing due to damage by military vehicles or private industry cooperating with the military authorities.

Our roadsides were in excellent condition previous to the war but are now fast becoming a liability and after the war will require a large amount of work to again make them an asset.

▼

Street Markers Made from Old Tanks

Due to the impossibility of securing metal signs old hot water tanks were used last summer by the city of Great Falls, Mont., for street marks. The tanks, the metal too badly worn to be reclaimed, were collected from householders, plumbing shops, gas appliance shops, and from back alleys. A coat of yellow paint, with black lettering for the street names and numbers, converted them into signposts. This part of the work was done by a local sign company. The cost of preparing the markers ready for installation averaged about $1.50 per unit.

Old Hot Water Tank Converted into Street Marker

City employees, under the direction of the city street superintendent, set the markers up a few at a time as they were collected and prepared. Set at a level of 31 in. above the ground, the tanks present a neat and uniform appearance.

▼

Traffic Volume on Penn. Turnpike—In November, 1943, 54,590 passenger cars and 25,147 trucks and busses passed over the Pennsylvania Turnpike compared with November, 1942, this is a decrease of 19.6 per cent for passenger cars and 5 per cent for trucks and busses. The percentage change from 1941 is —64.7 for passenger cars and —6.7 per cent for trucks and buses.

Funds definitely set up for the maintenance and operation of highways:	July 1, 1943 to June 30, 1944	July 1, 1944 to June 30, 1945
General Maintenance	$1,139,520.63	$1,142,944.67
Traffic Services	225,330.58	224,436.94
Bridge Maintenance and Operation	126,999.18	124,957.91
Contract Maintenance Projects	11,400.00	16,600.00
SUB-TOTAL	$1,503,250.39	$1,508,939.52
State Highway Snow and Ice Control	1,303,700.56	1,305,111.39
Town Road Snow and Ice Control	27,017.69	27,537.69
TOTAL	$2,833,968.64	$2,841,588.60

Asphaltic Concrete Tank Testing Track

Notes on design of pavement at Ford Highland Park tank arsenal, preliminary wear test, and condition after 350,000 miles of tank operation

WHAT happens to a pavement when 32-ton tanks thunder over it day after day is of special engineering interest for several reasons. If it lacks durability, frequent reconstruction and high maintenance charges will result, and surface deterioration will seriously interfere with acceptance runs. For, contrary to popular conception only a very few tanks—possibly one per cent of the output of each assembly line—are tested to destruction to develop improvements in design. The rest get routine "shakedown" runs. Uniformity of surface is essential for these runs, as is abrasion resistance, since wear means dust and dust and dirt mean extra cleaning cost before the final cost of paint.

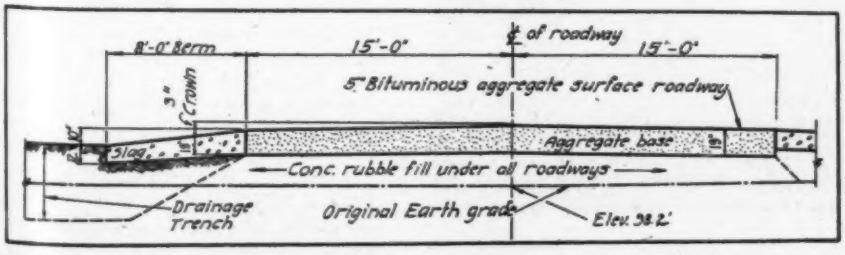
Tank test roads, therefore, must combine wear resistance with sufficient resiliency and strength to resist structural failure under direct load and impact. Impact is especially high, as can be imagined when a 32-ton vehicle (medium tank), consisting largely of unsprung weight and powered by a 550 hp. motor, moves at speeds up to 27 mph. or higher. The vibration set up by a heavy or medium tank in high gear can often be felt hundreds of feet away by a person standing on or adjacent to the roadway.

A medium tank in a high-gear run on the Ford Highland Park track in Detroit. Dust noted here is an exceptional condition caused by special test maneuvers just completed through adjoining mud holes. This track normally was kept clean with a power broom during routine testing operations

Ford Planned 1.2-Mile "Oval"

This pictures briefly the problem confronting Ford Motor Co. early in 1942 when preparing to make tanks at its Highland Park plant in Detroit. Decision to build tanks with steel instead of rubber treads added to the severity of the problem. Following a study of the design and performance of several other test tracks in the Detroit area it was decided to build a 1.2-mile "oval" (actually, a round-cornered rectangle) with a center cross-over for use in reversing direction of travel and thus equalizing wear on brakes. This layout was chosen in preference to a figure 8 with grade-separation bridge, as being more economical and reducing the total curvature in roadway alignment.

The ground chosen was the site of an old dump. It was at first planned to grade the entire property, but because of terms in the ground lease, grading was abandoned and attention turned to drainage of the uneven surface to remove ponds of standing water and control the water table. Catch basins and manholes in low places and several tile lines were installed. The roadbed for the track was graded without materially raising it above adjacent ground surface except for super-elevation at corners.



Typical cross section of Ford testing pavement

2-Course Asphaltic Concrete

The cross-section design tentatively adopted (and finally used) called for a 6-in. two-course asphaltic concrete surface over a 13-in. aggregate base built up and rolled in layers, or a total of 19 in. uniform thickness. Before final approval of the design a short experimental section was constructed, including about 700 ft. built with various types and sizes of aggregates. This brief test, conducted early in the summer of 1942, indicated that the proposed asphaltic design would have adequate durability in hot weather and the contractor was ordered to go ahead with construction.

Then on July 22 to 24, 1942, the test-section was tested for wearing qualities under carefully controlled tank runs totaling about 110 miles. Drivers made specified numbers of trips on each side of the track in alternating directions. The purpose was to assay the sweepings of pave-

ment material ground loose during the test, as a measure of wear and durability. Tanks in this test had to turn around in the field, and the runs were cut short to save destructive wear on the machines. However, the general adequacy of the proposed design was confirmed.

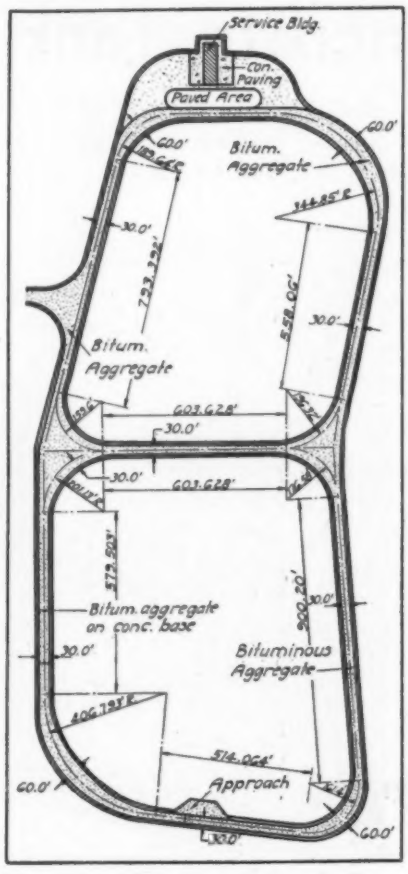
One Corner on Concrete Base

The pavement around one corner was built with a 10 in. reinforced concrete base, supported at each edge on a reinforced concrete retaining curb of varying height up to a maximum of 8 ft. 0 in. Curb is 24 in. wide at top and 36 in. at bottom (Fig. 1). Standard asphaltic construction as used on other parts of the track was then applied. (Consideration was given originally to a concrete sub-base for the whole job. It finally was decided that a small portion of the track be put in of this type of construction as an experiment.)

On another curve, sub-base material consisted partly of fragments of broken concrete obtained on the site.

In actual service the curved sections proved more durable than the straightaways, due probably to imperfect base compaction and drainage of certain local areas, along the tangents, as will be discussed further on. Another contributing factor is that the sliding action of a tank in making a turn had a tendency to keep the curves ironed out smooth, whereas on the straightaways the drivers were inclined to drive in the same groove.

At curves the 30 ft. pavement was widened to 60 ft. maximum, the extra width being added to both sides of the pavement. Curves were built to varying radii to suit the site—for the four main curves 406, 161, 344 and 189 ft. Three of the four main curves were superelevated a maximum of 3°-48", or a height of 48 in.; the fourth curve, only 24 in., since an approach drive enters at this point.



Cross-over rather than figure-8 arrangement of track was adopted to reduce curvature

Material Carefully Graded

In building up the base the first concern was to obtain more thorough compaction than is usually required of a highway or street base. A 20-ton roller was obtained for this purpose. Slag aggregates were put down in three or four lifts, and each layer thoroughly rolled and slag screenings rolled in until the surface wouldn't take any more. About 50% of the base was rolled in four lifts, 20% in two and 30% in three lifts, the latter being the most satisfactory. Three-lift specifications were as follows:

Bottom base course (7½ in. compacted)
- Passing 3½-in. sieve—100%
- Passing 3 -in. sieve— 90-100%
- Passing 2 -in. sieve— 0- 25%
- Passing ¾-in. sieve— 0- 15%

Second course (2½ in. compacted)
- Passing 2 -in. sieve—100%
- Passing 1½-in. sieve— 45-85%
- Passing ¾ in. sieve— 0-10%

Third course (3 in. compacted)
- Passing 1 -in. —100%
- Passing ¾-in. — 85-100%
- Passing ⅜-in. — 50- 75%
- Passing No. 4— 25- 55%
- Passing No. 10— 5- 20%
- Passing No. 200— 0- 15%

Usual road-mix methods of placement were used in base construction. Earth binder or stabilization material was processed in and each layer sprinkled and compacted. Fine materials as follows were added to the first two layers of the sub-base.

Fine Aggregate
- Passing ½-in. sieve—100%
- Passing ⅜-in. sieve— 90-100%
- Passing No. 40 sieve— 15- 45%
- Passing No. 200 sieve— 0- 15%

Slag dust was processed in as a binder, sprinkled and rolled thoroughly. The result was actually a macadam road.

Asphaltic Concrete Topping

The asphaltic concrete was placed in two 15-ft. construction lanes in 6-in. side forms, using a standard asphalt paver. Hot-mix materials were delivered about 4 miles by The Detroit Asphalt Co. Great importance was attached to securing a dense, perfectly graded mix. Gradation specifications:

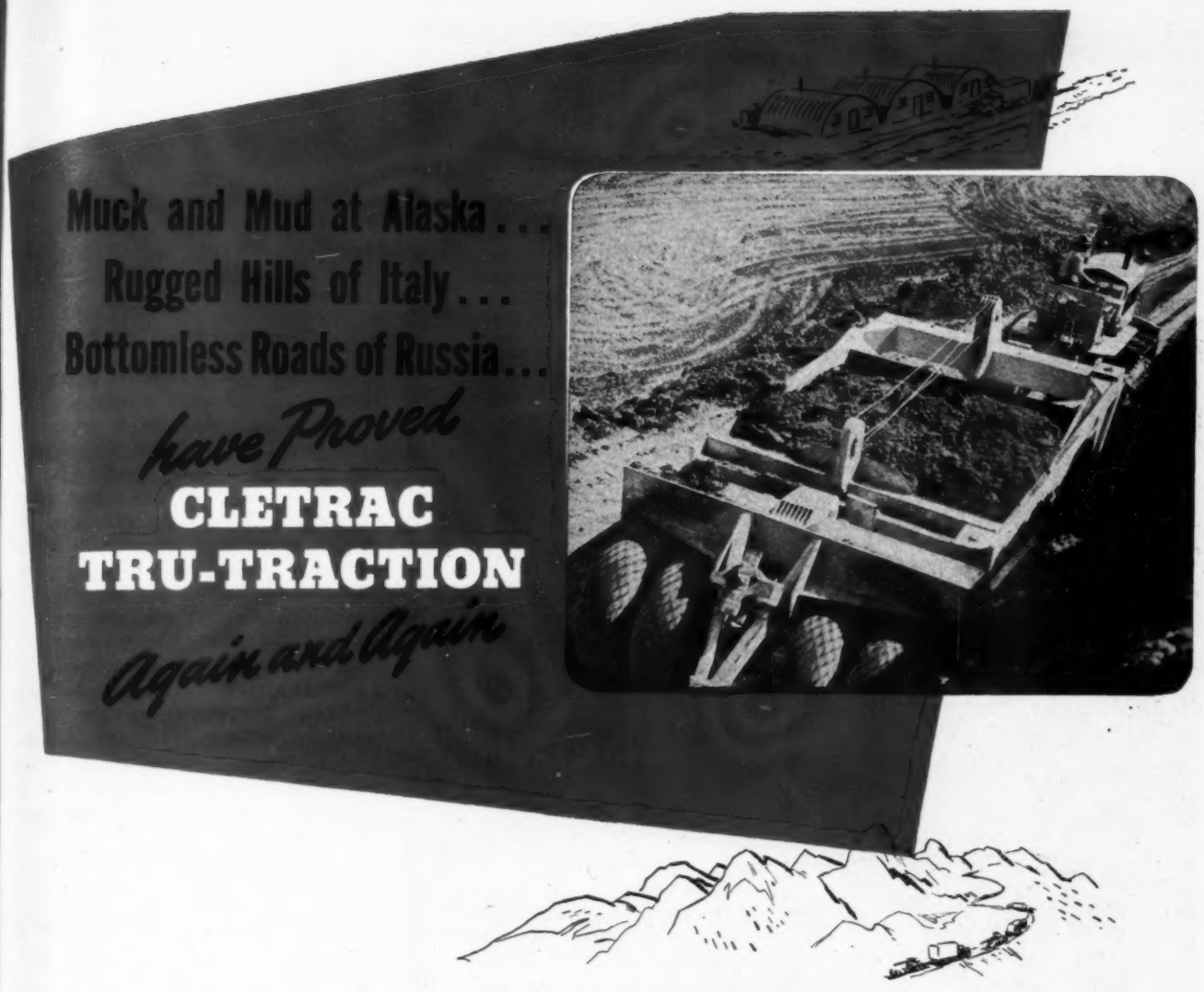
3½-in. binder course to consist of:
- Course aggregates retained on No. 10—65-80%
- Material passing No. 10—15-35%
- Bitumen (asphalt pen. 80-110)—4-6%

Binder course aggregate was carefully graded from 1½ in. down. Temperature of hot-mix placement 275-350° F.

For the 2½-in. wearing course the bituminous aggregate was specified as follows:
- Passing 1 -in. —100%
- Passing ¾-in. — 45-55%
- Passing No. 10— 35- 45%
- Passing No. 200— 5- 8%
- Bitumen — 6- 8%

Placement temperature, 300° F. A typical batch for the wearing course consisted of: 55% aggregate stone, 33% sand, 6% filler and 6% asphaltic cement. Prior to placing the wearing

Showing one of 4 or 5 local depressed areas resulting from sub-grade failure—the only noticeable defects in the Highland Park pavement after 350,000 miles of tank runs. This condition due to excessive subgrade moisture and imperfect compaction during construction



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course the binder course was given a bond coat of asphaltic emulsion in accordance with Michigan state highway specifications AE-2.

Sub-Base and Hot-Mix Aggregates

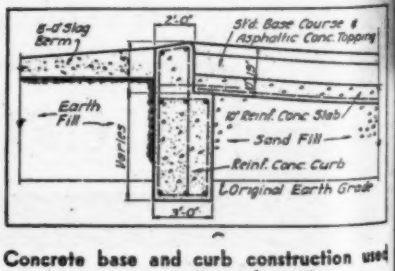
While some crushed limestone was used at first, crushed slag was used for most of the track because more readily available. Slag was considered slightly more satisfactory than limestone.

Condition After Test Runs

Routine testing of tanks began August 21, 1942, and continued until late in 1943 when tank production was halted at the Highland Park plant in line with military needs. During this period of more than a year about 350,000 miles of tank runs over the track were recorded. Virtually all tanks were equipped with steel treads (see accompanying photograph). The early 75-mile test run was soon cut down to 50 miles. The procedure was for each tank to travel 2 miles in first gear (1 mph.), two miles in 2nd, four miles in 3rd, seventeen miles in 4th, and five miles in 5th gear (26 mph.) Tanks ran a short distance in reverse at the crossover. From 12 to 20 tanks per day were in operation on the track. Slow-speed runs were confined along the outside lane at first, and the final fast runs on the inside. Later the paths were reversed to equalize surface wear. The surface was kept clean with a power street broom.

An inspection of the track was made on October 11, 1942, after six weeks of operation, in which tanks had run 18,000 miles. The engineer's report stated that there was "little perceptible wear . . . It is apparent that the top wearing surface is in even better condition than at the time work was installed. The track shows no signs of crystallization or cracking, nor does it indicate fracture at the edges where such deterioration might be expected."

Again on February 5, 1943, the track was inspected in detail by a party consisting of representatives of the Ford Motor Co., the designing engineer, and two asphalt specialists from the City of Detroit. Four sur-



Concrete base and curb construction used on an experimental section

Except for a few tanks near the end of the testing period, all tanks using the Highland Park track had steel treads as shown here

Close-up showing the dense, close-textured surface of the asphaltic concrete. This surface has been worn down by the steel treads

face areas that had indicated pavement weakness were observed, none of which indicated excessive wear. Three of these areas were along a side of the track that had presented difficulties in securing a proper subbase and in getting good drainage during construction. The affected areas had become slightly depressed but no breaks had occurred in the surface. One spot of deterioration was apparently due to a faulty batch in the asphaltic mix, since aggregate tended to ravel.

Minor surface patching was recommended and subsequently carried out. Defective areas were cut to a depth of 2 in. or more, the hole cleaned and thoroughly dried, asphalt paint applied, and a hot-mix asphaltic concrete or sheet asphalt applied and hand tamped.

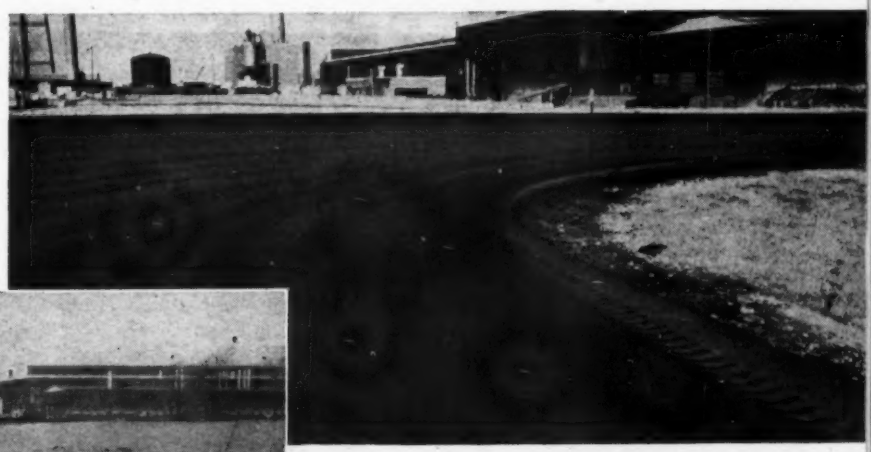
In Excellent Condition Today

No attempt was made to correct any evident weakness in the subgrade at these points, as the depressions had apparently reached a point of stability.

Quick visual inspection of the track in November, 1943, after completion of 350,000 miles of runs, showed the track to be in generally excellent shape. Several shallow depressions were in evidence along the path where tank treads had concentrated, but the pavement was virtually free of surface breaks and structurally sound. Earlier observation during tests showed that on hottest days the surface would become slightly "chewed up," but that rough spots would become ironed out and minor raveling kneaded back together.

In conclusion, it is the belief of the Ford Motor Co. personnel and the designing engineer that this pavement, as designed and constructed, represents an economical solution to the problem of obtaining a durable testing runway for medium or 32-ton tanks. The success of the track is attributed to the provision of these factors: good drainage (better drainage facilities would be provided if built again); adequate load carrying capacity, through thorough compaction and ample total cross-section; high abrasion resistance, from use of tough aggregates; and resiliency against vibration, resulting from the asphaltic construction.

The Highland Park track was built by Julius Porath & Sons Co., Detroit contractors, for the Ford Motor Co. under U. S. Army Ordnance. Leo M. Bauer, Detroit architect, designed the project and conducted the tests and inspections noted.



Sharp turns were built in preference to long easy turns, to reduce wear on tank mechanism

These marks are not surface depressions but "eraser marks" left by rubber treads at turns. Tanks are not usually equipped with a differential, hence one or both treads must slip slightly while turning

Scenes at the new Chrysler tank track, Detroit

. . . reconstructed during 1943 to asphaltic concrete design similar to that of the Highland Park track

Use of Spider Silk as Cross Hairs

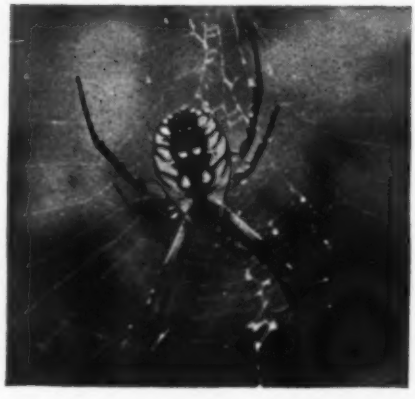
Repairing transits and levels in wartime is calling for a lot of ingenuity. Before you tackle cross-hair replacement, read this interesting article.

By JOHN G. ALBRIGHT
Head of Physics Department, Rhode Island State College, Kingston, R. I.

WHEN Charles Mason and Jeremiah Dixon came to America in 1763 to run the famous "Mason and Dixon Line" between Maryland and Pennsylvania they brought with them the finest surveying instruments available in England. When they arrived in Philadelphia, they were surprised to find that an astronomer, clock builder and instrument maker of that city was making better surveying instruments than those which they brought with them. This instrument maker, David Rittenhouse, was the first a few years later (1786) to use spider silk as cross hairs to mark the optical center of the telescope in his transit instruments. His priority in regard to this useful invention was acknowledged by E. Troughton, the famous instrument maker of England, who brought spider silk lines into universal use in astronomical instruments. They have been used for that purpose ever since, and no other fiber, either natural or artificial, has been found superior to them.

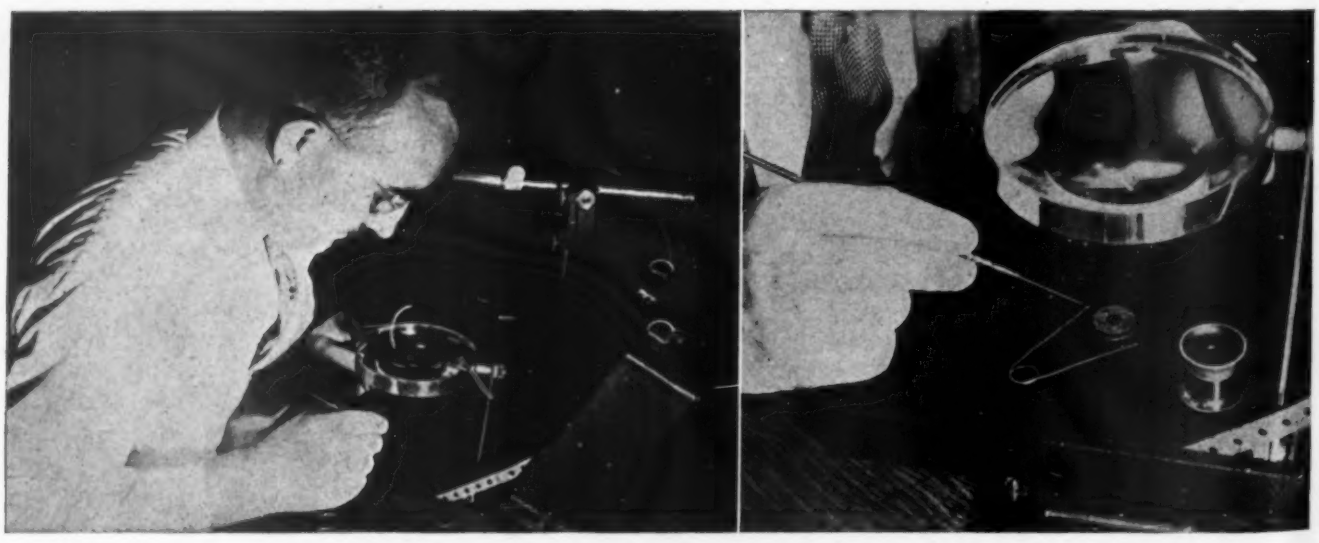
Why Spider Web?

The usefulness of spider silk as cross-lines depends upon several factors: their f i n e n e s s, uniformity, strength and ability to withstand great changes in humidity and temperature. While the silk of all spiders might appear to the casual observer to be very much alike, great differences are observed on careful examination in the laboratory. Only two or three spiders have been found whose silk meets the rigid requirements of the astronomer and optical instrument builder. They are all "orb weavers," producing webs of fine, strong threads in which to ensnare and entangle their prey. One of the best of these is the large Golden Garden Spider (*miranda aurentia*), a beautiful black and yellow spider, with a body almost an inch long (female). She spins a beautiful geometrical web swung vertically between the branches of a blackberry or other bush. This web, although fine and almost invisible, is strong enough to support easily the heavy spider or hold the struggling ensnared grasshopper.



Meet Miranda Aurentia, whose web makes good cross hairs

The spider matures sometime in the late summer, usually about the middle of August, after which the silk can be taken from the female by "milking." In this process the spider is held in a yolk in such a way that she cannot reach the thread with her feet. The fiber is then drawn from her harmlessly and wound on reels which can be kept indefinitely. The silk as drawn from the spider is stranded, consisting of as many as six separate threads, each coming from one of the six nipple-like spinnerets arranged in a circle near the posterior end of her abdomen. Although this operation is harmless to the spider, she objects to it very strenuously and will sever the thread with her feet if she has the opportunity. She is powerless, however, to prevent the drawing of the threads from her spinnerets once they have been started; this is accomplished by gently rubbing a tooth pick over the spinnerets. As many as ten or eleven 50 ft. reels have been taken from a full grown female at one milking. The sticky fluid from the spider's spinnerets hardens rapidly when exposed to the air. The silk is wound on convenient reels in length of 50 or 100 feet, and stored in dust proof containers; it can be preserved indefinitely.



Mounting cross hairs calls for some delicate manipulation (see text)

0.0001-in. Diameter

The silk taken from the Golden Garden Spider has a diameter of about 0.0001 inches or 2.5 microns. Under the microscope it appears solid, almost completely transparent without any internal structure, of approximately circular cross section and uniform in diameter. It has a specific gravity of about 1.30 to 1.37 and an ultimate breaking strength of about 60,000 lb. per sq. in. It has a considerable amount of elasticity, but also shows some flow properties. It continues to be extended under a constant stress for some time but recovers upon the removal of the stress.

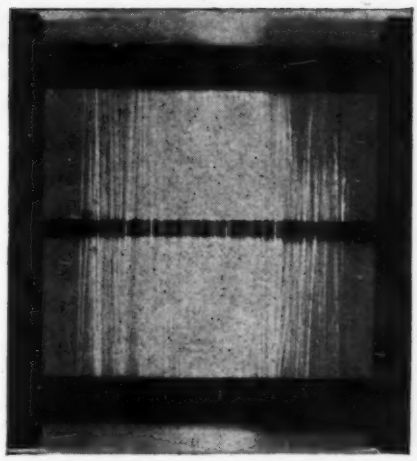
A century and a half of use as cross lines has tested the reliability of spider silk, its ability to withstand changes in temperature and humidity, and its ability to withstand oxidation, the bane of artificial and metal fibers when used as cross lines. In many installations spider lines have been known to last more than half a century, often outlasting the instruments themselves.

Spider silk is not surrounded by an enveloping substance like the sericine of ordinary silk. In microchemical tests it is shown to be similar in composition to true silk. In very humid atmosphere the silk absorbs moisture. This causes the cross lines in the surveyor's transit to sag when water gets into the telescope, however their tautness is restored on drying out the telescope.

How Hairs Are Installed

To install the cross hairs in an optical instrument requires some skill and patience. This work should be done under a strong illumination, and over a dead black background such as that afforded by black velvet cloth. In the instrument, the cross hairs are usually mounted upon a removable ring or reticle; in the cheaper instruments this ring is often held by friction, but in transits and levels used in surveying they are held by four capstan screws. The ring must be removed and thoroughly cleaned of the cement used to fasten the old cross hairs. The old cement can be removed by use of alcohol or amyl-acetate depending upon whether shellac or a plastic cement was used. On the ring will usually be found fine scratches or lines used to define the position of the hairs. On cleaning the ring, care should be taken not to disturb or mar these scratches; they are very fine and have been put on the ring with precision by means of a dividing engine or an engine lathe.

In order to facilitate the handling of the fiber of spider silk a hair pin



A spider will sometimes yield 400 to 500 ft. of silk!

shaped piece of brass wire is used; the two prongs being apart about twice the diameter of the reticle upon which the cross-hairs are to be mounted. The ends of the prongs are dipped into "Duco" cement to render them tacky. They are then inserted under one of the strands on the reel and on being lifted up, the strand of spider silk will be found adhering to them and stretching from prong to prong. This strand will very likely be composed of several fibers of the silk; only one is wanted. A convenient tool for separating the fibers consists of a fine needle mounted in a long handle similar to that of a fine camel hair brush. Holding the brass hair pin or wire frame with the strand of spider silk taut from prong to prong under the bright light and over the black velvet with the left hand the needle is inserted through the strand of silk with the right and with a sidewise motion all the fibers on one side of the needle are broken, whereupon this operation is repeated until only a single fiber is left.

A Delicate Job

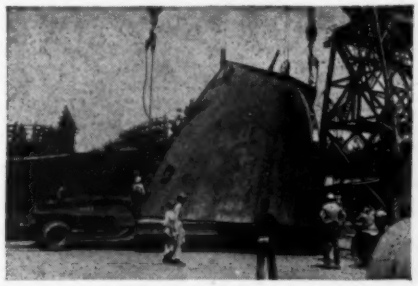
The wire frame is then laid down so that the taut fiber of spider silk lies across the reticle in the desired position and the other end of the wire frame rests on the table. The fiber should support the weight of the prongs of the wire frame thus stretching it tightly across the reticle. If the fiber does not rest in the grooves or scratches intended for it, it can be gently eased into position by use of the long handled needle, care being taken that the sharp edges of the reticle do not cut the fiber.

When the fiber is in place it can be cemented by placing a tiny drop of shellac or "Duco" cement on either end. The fiber and reticle must not be disturbed until the cement has set after which the superfluous fiber can be cut away with a small sharp pair of embroidery or cuticle scissors. The rest of the cross-hairs are placed on the reticle in the same way following the pattern as laid out in the grooves or scratches. Patience and care are essential, especially when two or more cross-hairs are mounted on the same reticle, but if one does not hurry or become impatient, he will be surprised at the ease with which this difficult task can be performed. Of course the reticle must be returned to its place in the instrument and tested for position by the usual methods.

▼

Trailers Speed Shipbuilding

California Shipbuilding Corporation solved the problem of moving giant sub-assemblies, often the full ship width, by using Fruehauf heavy-duty trailers as shown. Former methods involved elevated cranes in the access road to unload incoming ma-



Moving bulky prefabricated sub-assemblies on trailer

terial, which would then be picked up by the hull crane. The front of the trailer, or goose-neck, is designed so that it may be used with a tractor truck, or, by using a converter gear under the front of the trailer it can be towed by a yard tractor.

▼

Chas. M. Upham, Engineer-Director, ARBA KENTUCKIANS—Kentucky Society of Professional Engineers Outgoing Pres. M. J. McGruder, city engineer of Lexington, Ky., and Pres-Elect E. A. Marye, state engineer, Federal Works Agency, Louisville. Photo snapped at the Society's recent annual meeting at Lexington at which J. S. Watkins, state highway engineer, Washington Reed, vice-president of Kentucky Utilities Co., C. W. Lovell of Portland Cement Association and Harold J. McKeever Editor of "Roads and Streets" were speakers

"Welcome to Burma . . . Courtesy of the Hairy Ears"

By Special Correspondent

Modern power equipment in the hands of Alcan's pioneering engineer troops is making fast time on the Burma road's successor

HIDDEN away in an obscure news release recently was an answer to a mystery . . . what happened to the army engineer boys who built the Alcan Highway?

They are doing a bigger job in India.

The army has now released information, hitherto secret, through the New Delhi office of Reuters, regarding the latest work of these American engineer troops. They are building a new route toward northern Burma to replace the old road long since captured by the Japanese.

Built as only Americans and American machines can push a road job, this new route will eventually link Allied territory with new frontier. The road is being built across India's eastern border, crawling along her valleys and winding snakelike up the Himalaya slopes. It traverses malaria infested valleys and sometimes soars to 4,000-ft. elevations. Long before the road is finished it will supply front-line forces in action against the Japs. Somewhere between Chungking and Lashio it may eventually link up with the old Burma Road.

More Modern Methods Than on Burma Road

There is little similarity between the construction of the new route and methods on the old Burma Road. The old route was gouged entirely by coolie hand labor, using only a few American-made compressors and drills in heavy rock. It was a hand-built job.

The new route is a different story. The army engineers here are the boys who originally put road building on a mass-production basis. They are the men who sent a machine ahead to do one job and then never let it come back over the same piece of road the second time.

These specialists have no American contractors to help them on the Indian route, as on Alcan. Taking dozers, motor graders, scrapers, trucks, shovels and drilling tools, they went the long way alone. On arrival they hired a motley army of Indians, Hindus and Chinese for manual labor.

All the natural obstacles that ever teamed up to plague a road builder are present on this new "Road to Tokyo." Clearing is particularly difficult. Cuts made through unstable material quickly choke with slides. Leeches fasten on the men and glut their lifeblood. Malaria is so prevalent that drugs are given regularly to counteract it. The road builders are 8,000 miles away from home and replacement parts, so maintenance of equipment is vitally important. As the road moves forward into Japanese-held territory the builders face hidden snipers.

As to modern methods, aerial photography still forms the basis for selecting the final route, and local survey parties juggle the road into the topography as they find it. Clearing is a gigantic job, as on the Alaska Road, but in a different way. You do not push mahogany and teakwood trees over with a bulldozer. The only effective means is blasting. After that, dozers pile the big trees and clear away the smaller trees and jungle growth.

Battalion Organization

In one engineering battalion, the work was streamlined by companies. "A" Company worked on "The Point," pushing a narrow trail just wide enough to accommodate army equipment forward. Company "B" did the drainage work, installing drain pipes (up to 6-ft. dia.) to carry off heavy monsoon rains that flooded down the ravines.

Company "C" followed, widening, backfilling and grading the road. Naturally, considerable rivalry between companies developed, which seems like good executive planning on the part of Major General Raymond Wheeler, commanding officer.

Just west of the India-Burma borderline there was encountered a 100-yd-thick formation of solid rock on a vertical cliff. The lead bulldozer couldn't bit into this kind of obstacle. After jackhammers, compressors and dynamite had "softened up" the point, the dozer began pushing the loose boulders over the side. The man waited to hear them crash below. There was no sound. They were too high up to hear it.

Portable sawmills in advance camps worked mahogany and teakwood into lumber, then used to erect concrete formwork, build office furniture, etc. The camps themselves were clusters of quickly-erected bamboo bashas (huts) camouflaged under forests of giant hardwoods, deadly green jungle, and surrounded by acres of wild, pale orchids.

The right-of-way for the new road was secured by a triumph of negotiation. Over a year ago Capt. James

Arthur Kehoe started out through the Burma jungles with a sackfull of cheap watches for trading purposes. Kehoe's job was to survey the wild country along the route, keep an eye open for military outposts, and negotiate passage with the Naga headhunters who infest the country.

Tractor Picturesquely Named

He did his part of the job well. The first contingent of Hairy Ears moved in through the tea fields into the eastern fringe of India's Assam Province. They set up their advance camps, unloaded machinery, worked seven days a week through incessant rain and temperatures that soared to 130°, and griped to the high heavens as good soldiers will. With grim humor one midwestern corporal named his bulldozer, with neat white letters, "My Assam Draggin."

All the different steps of road building were carried in sequence, except sometimes for a stubborn cliff which called for a ganging-up of equipment. Sometimes slides, mud and dust would cover the road as soon as finished. When Colonel Charles Gleim, commanding the advanced engineers, was asked about progress he answered curtly, "doing great—only lost a half mile this month."

But the fact remains that after 9 months of construction the first leg of the road is finished. How far into Burma the road has been extended is still a military secret. So is the specific destination. But the general direction is obviously toward the Japs entrenched in northern Burma.

Super-Problem: Supply

Nearly as much a problem as natural obstacles was that of supply. Here were machines literally thousands of miles away from home. In America, construction within 100 miles of a parts dealer makes supply rather easy, but in Assam Province it was a different story.

Special planning was needed on fuel and lubricants, mostly imported from U. S. Diesel fuel was stored in new tanks and somehow kept clean and free from condensation and water in this steaming, rain drenched jungle. The care they took of their fuel added many a working hour to injectors and fuel systems generally.

The supply of wire rope was considered important, because cable controlled machines were doing all the work. Imported American-made preformed plow steel wire rope gave excellent long-life service through ability to resist bending fatigue and drum crushing. Spare parts and units such as cams, pistons, water pumps, and so on were taken along in the initial

This road, too, has a Tokio destination, as indeed all army-built roads have in the vast Jap war theater

set-up. But no supply officer, however brilliant, ever thought of everything, and for this reason advance outfits carried small portable machine shops and a supply of stock to manufacture spare parts on the job.

Many Tall Tales

The engineer troops tell tall stories about the road, but more truth than fiction. One dozer operator, while cutting a shelf out of a Himalayan slope, looked up after he had ducked small pieces of dirt and rock sifting down past him. The entire slope was beginning to slide! He leaped off his machine and got in the clear before hundreds of cubic yards of stone and shale rumbled down over his tractor. They had to blast away tons of rock.

Picked Chinese combat troops, under U. S. Brigadier General Haydon Boatner and led by Virginia Military Institute graduate Lt. L. J. Ten-Sun, stayed well ahead of construction, driving back the roving Jap patrols. When the road advanced into enemy held territory, security guards were posted along the flanks and the engineers carried their own guns.

A cocky American sign is posted at the start of the new route at "X Base," to commemorate a difficult job. It reads, "Welcome to Burma—Courtesy of the Hairy Ears."

▼

Traffic Volume Decreases—Preliminary data for November from 546 automatic traffic recorders in 41 states indicate a decrease of 17.9 per cent as compared with November 1942. Decreases at stations located on local highways were 15.3 per cent.

Air Photographs Used in Planning Express Highway

Aerial photographs combined with land valuation maps and maps showing structures gave unusually effective results in planning for an express highway in Chicago. The methods used were described by Robert Kingery, General Manager, Chicago Regional Planning Association, in a paper presented at the 23rd annual meeting of the Highway Research Board.

Directed by the Board of County Commissioners to plan the construction of an express highway within the city of Chicago and extending from the central business district northwesterly to connections with major highways at the city limits. Major George A. Quinlan, County Superintendent of Highways, obtained a complete set of air photographs, of a wide belt of the city of Chicago within which this route would lie. These photographs were taken from directly above the center of each 160 acre quarter-section of land, and were printed at a scale of 1 in. to 200 ft. They were fitted together, and for all practical purposes served the purpose of a mosaic with the advantage that they could be taken apart and studied in further detail.

Parallel to the air photographs was the compilation of generalized land value maps. From the records of valuation for assessing purposes, and from long experience in buying and condemning lands for highway purposes, maps were compiled showing the estimated actual cost per square foot to acquire each block which might be traversed by the express highway. Using this generalized map, which was colored to portray values on three different bases—under $1.50 per square foot, $1.50 to $3.00 per square foot, and over $3.00 per square foot—the objective was, of course, to follow the lowest cost route where such a location would be as good in all other respects as a more costly one.

Still a third course of information, readily available, was the set of Sanborn Fire Insurance Maps. Among other things these maps accurately show every building, its height in stories, whether built of frame, brick, concrete or structural frame, and usually the use to which it is put and the owner, if a large industry.

Combining the use of these air photographs, land valuation maps and Sanborn maps showing structures, a series of preliminary locations and combinations of routes, with their costs, could be studied with a greater degree of accuracy, and considerably less expense for such reconnaisance than in any other way.

In Hartford, Conn., rails being torn up by extractor, powered by a truck-winch-operated block and tackle. Only a narrow strip of pavement is disturbed.

Winch-Powered "Extractor" Speeds Rail Salvage

Parallel H-beams hold surrounding pavement during extraction, leaving a clean narrow trench

By FORREST WALDO
Applied Engineering Dept.
Air Reduction Sales Co.

MUNICIPAL officials still considering digging up embedded street car rails for scrap will be interested in a removal method which is simple, labor saving and economical. In contrast with previous hand methods rails are literally ripped from their foundations, spikes and all, by a powerful hoist or "extractor" which accomplishes the job in record time.* Slow going for rails fully embedded in concrete and asphalt is 80 ft. per hour, while less firmly established tracks have been removed at a rate up to 2,000 ft. in an 8-hr. day. And contrary to expectations, the pavement 6 in. away from the rail on both sides is undisturbed. Final re-paving usually requires less labor and materials than when track is removed by the customary methods

As shown in the photos the "extractor" employed consists of two reinforced H-beams lying parallel astride the rail, surmounted by an A-frame support for a heavy block and tackle. The rail is gripped by self-closing dogs which, when raised by the pulley arrangement, exert as much as 75-tons upward pull upon the rail, forcibly withdrawing it from its foundations. The counteraction of this force presses the H-beams hard against the pavement, thus limiting the uprooting of the concrete or asphalt to a narrow strip 18 in. wide in all. Re-paving involves only clearing out any loose materials and filling the pit to surface height.

Hartford Salvages 61 Miles

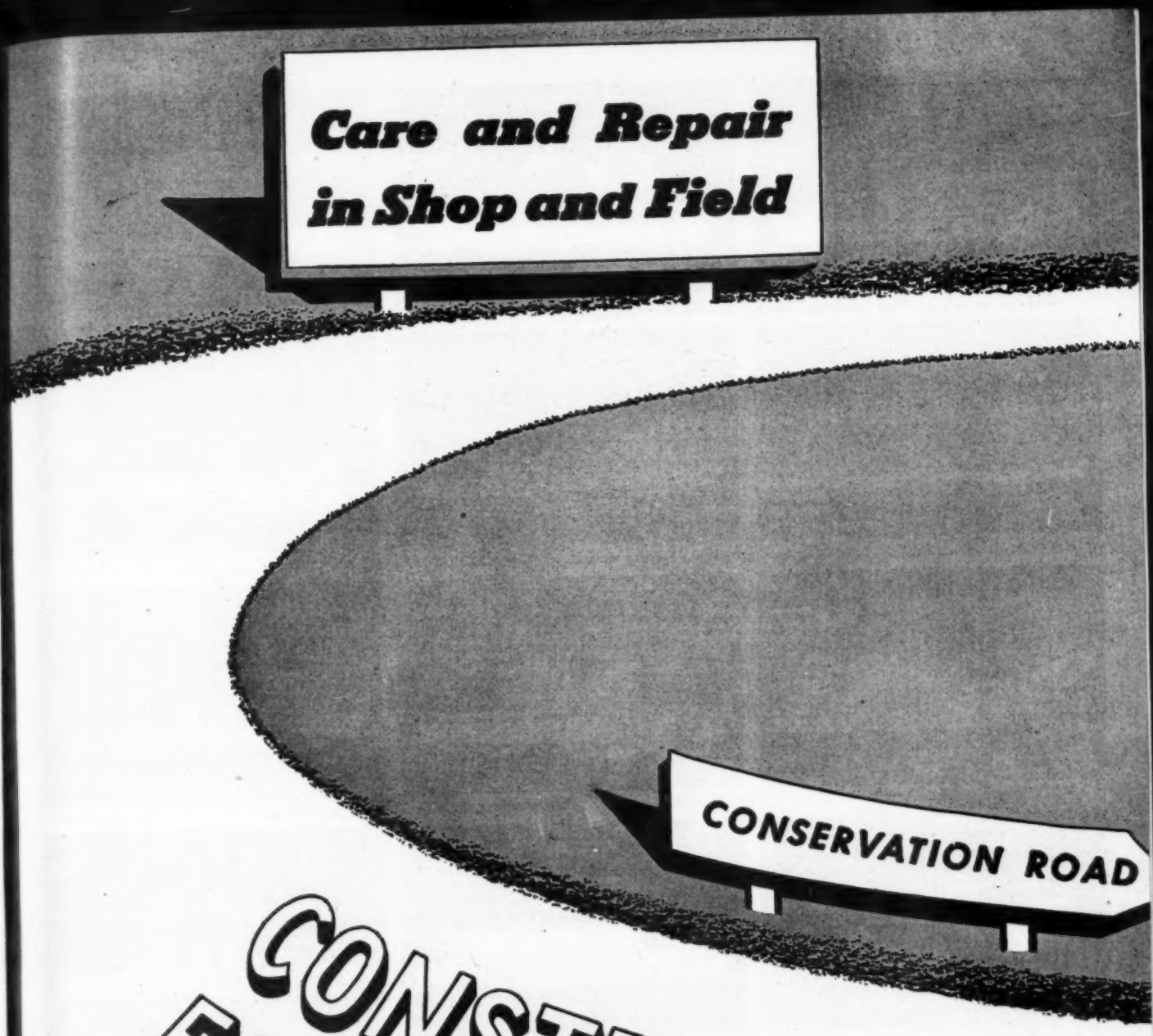
The rail in the city of Hartford, Conn., where these photos were made, lay beneath 3 in. of concrete and 3 in. of asphalt which imposed strong restraint, so that the upward pull bent the rail considerably. To keep it to manageable length the rail was cut into 20-ft. sections with an oxyacetylene cutting torch (Airco) as the work progressed. These lengths were then transported intact to railroad flat cars. There were 61 miles of street railway track, totaling 6,500 tons of rail to be removed. The work was done by the contracting firm of Heron Todd, Washington, D. C., which has kept four of the "extractors" busy, moving from city to city. Hartford, as owner of the transit line, paid the contractor a fixed sum per foot of rail removed, and received upwards of a quarter million dollars for the scrap rail, valued at $40 per ton in 15 to 20-ft. lengths.

The extractor is drawn by a truck, moving forward 5 or 6 ft. at each "bite." The truck carries all necessary equipment, including cylinders of oxygen and acetylene for the cutting torch, and it has a small winch to provide power for the block and tackle. As a rule the riggers pay no attention to joints in the rail, but as a precaution against delays caused by breakage of the joint tie plates a pneumatic digger crew, working in advance, digs out the asphalt for a few inches around each joint. Many of the embedded tie rods running transversely between the two rails of a track break off when the rail is lifted; the others are cut with the torch as removal progresses. Cutting of the rail itself takes only 90 seconds, with torch operating 55 lb. oxygen pressure and 6 lb. acetylene pressure.

*See also article, "Salvaging 10,500 Tons of Rail," by C. L. Wartelle, City Engineer, Seattle, Nov., 1943, Roads and Streets—Editors.

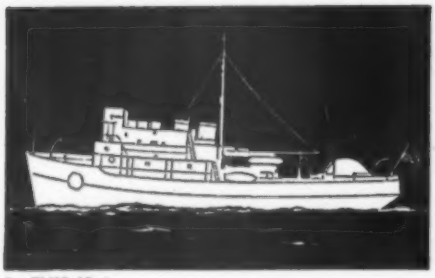
Uplifted rail is cut through in 90 sec. with an oxyacetylene torch. Removal proceeds at 80 to 250 ft. per hr.

Traffic passes freely during removal. Cutting equipment is carried on the truck, which also provides power for the lifting rig.



CONSTRUCTION EQUIPMENT MAINTENANCE

A SPECIAL SECTION OF ROADS & STREETS



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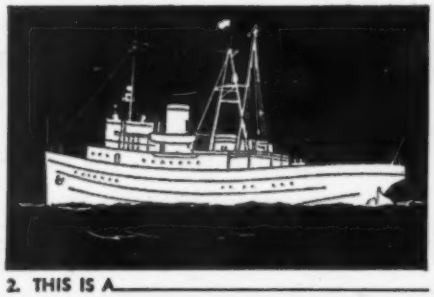

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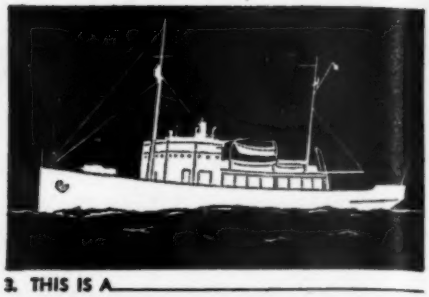

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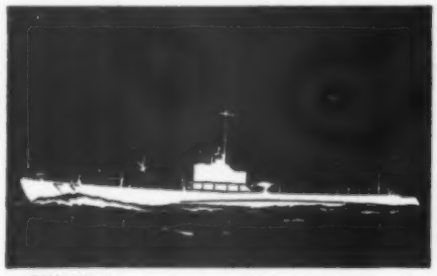

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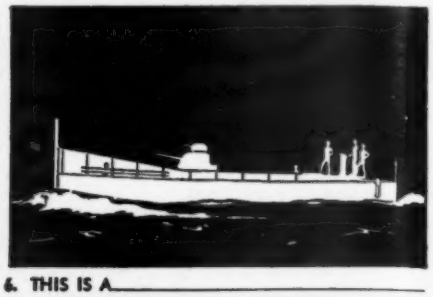

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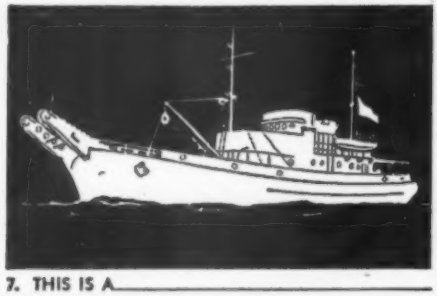

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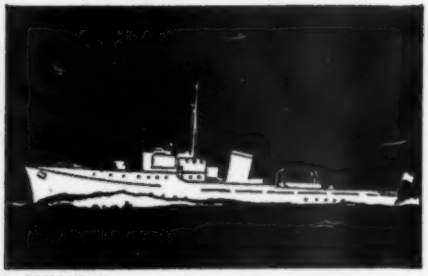

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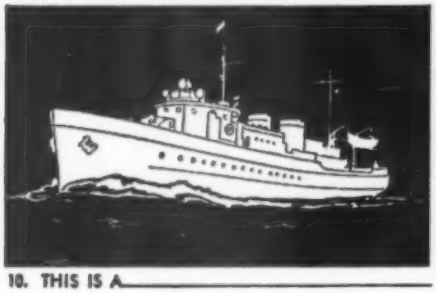

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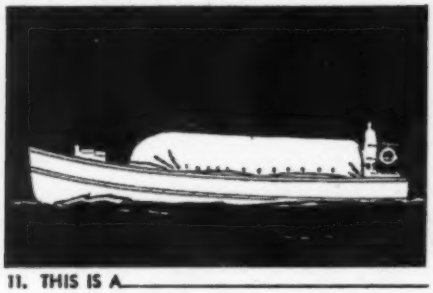

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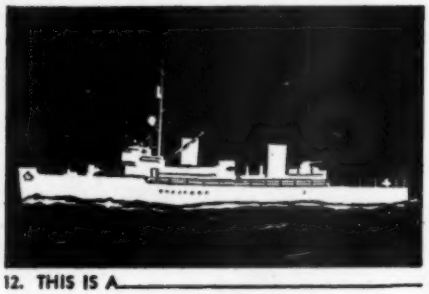

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STANDARD OF CALIFORNIA

Equipment Maintenance

Notes on a Busy Contractor's Winter Overhauling

CODELL Construction Company's headquarters shop at Winchester, Kentucky, has been a busy place this winter. This firm, one of Kentucky's largest earth moving and road building outfits, as usual has spent the off-season overhauling its equipment. Considerably better equipped and organized than most contractors' "yards" is this firm's headquarters, comprising a 72 by 150 ft. main building and two adjoining buildings.

The main garage has an overhead crane with two chain hoists, running through the central bay. Machine shop equipment includes a large and a small lathe, power hack saw, grinders, drill press, hydraulic press, acetylene and electric welders (two or more of each), shop compressor, small compressor for air-cleaning, bit grinder, valve grinding and other automotive bench equipment, and some 75 ft. of bench space along the walls.

This shop is, of course, supplemented by field shops, the completeness of which depends on the size of the project. Electrical and carburetor work and other highly specialized repair jobs are sent to commercial or distributors' shops.

Walled off and extending into a wing is an unusually complete and highly organized parts and supply depot. A feature here which has proved a great labor and time saver is the storage of bolts and nuts in specially marked bins. Bolts needed in hundreds of diameters, lengths and threadings make up a constant supply problem. Bolt bins are located nearest the stock room door and conspicuously marked, for quick accessibility. Also worked out to fit the needs of the Codell outfit, are special bins for grease fittings and allied parts, and sections for each make and model of major machine or unit owned in large numbers.

J. E. Hunter, mechanical superintendent "talking shop" with a Codell field engineer, H. K. McCormick

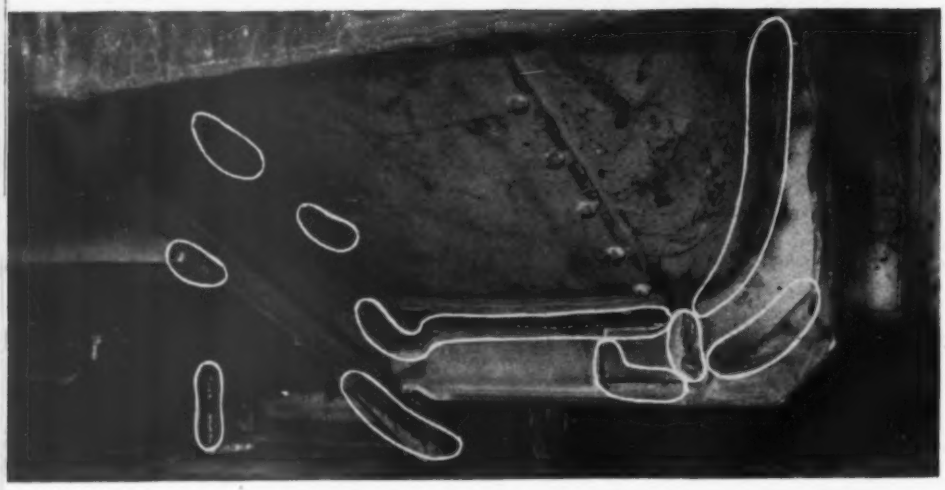
More valuable parts are behind wire partitions under separate lock and key.

A separate shop takes care of tires, and there's one for jackhammer parts and bits. In addition, a concrete-floored storage building, with one side partly open, was built for storage of miscellaneous equipment that can stand weather, including bins of used parts, plumbing supplies and fittings, concrete vibrators, pumps, carts, cable drums, tarpaulins, hose and belting, barrows, hand tools, etc., etc.

Normally 12 to 14 men make up the shop crew. These comprise 3 welders, 4 mechanics, 4 helper mechanics, 2 trailer operators and several laborers. Three heavy-duty trailers are a vital part of the Codell scheme, since the firm takes jobs in Tennessee and other surrounding states and often must haul its shovels and other heavy equipment long distances over the roads.

Codell has a railroad grading job this winter, and a Kentucky timber-access highway contract. To help keep these vital jobs moving and get equipment in best possible shape for any need, the firm was able to get several truck loads of long-awaited parts recently.

Headquarters shop of the Codell Construction Co. Winchester, Ky. Note ramp for loading trailers, of which Codell keeps three busy shuttling to and from jobs in several states



OVERHAULING A EUCLID DUMP TRUCK

Euclid Dump Truck Overhaul

Typical of the thorough overhauling required to renovate hard-used machines, is the following partial list of work just completed on a 12-yd. Euclid dump truck, brought in from an airport.

To begin with, the boys tore the machine down until "there was nothing left on it."

As routine all wheels were taken off and inspected minutely. The front end had been thrown badly out, probably in a collision, and field substitution of a ¾-in. bolt from a broken 1¼-in. right spindle bolt hadn't helped the alignment any. Front wheels were realigned and given new spindle bolts and front-end bushings. Brakes were overhauled. One entire wheel was replaced.

The Cummings diesel motor was sent to a distributor where it was entirely overhauled and new standard pistons and sleeves installed. Copper oil-gauge and hydraulic lines and bronze connections were repaired and in many cases entirely replaced, scores of small threaded fitting parts being manufactured in the Codell machine shop.

A badly bunged up radiator was soldered and bronze welded, to do for the duration.

Then off came the dump body, whose bottom pan had cracked open and underframe had buckled. While a new hoist pump and power take-off were being installed in the chassis, the welders burned away the body pan and put in a new pan sheet and underframing, using two lengths of standard 12-in. channel steel for the under-rails because of delay in delivery of factory replacement framing.

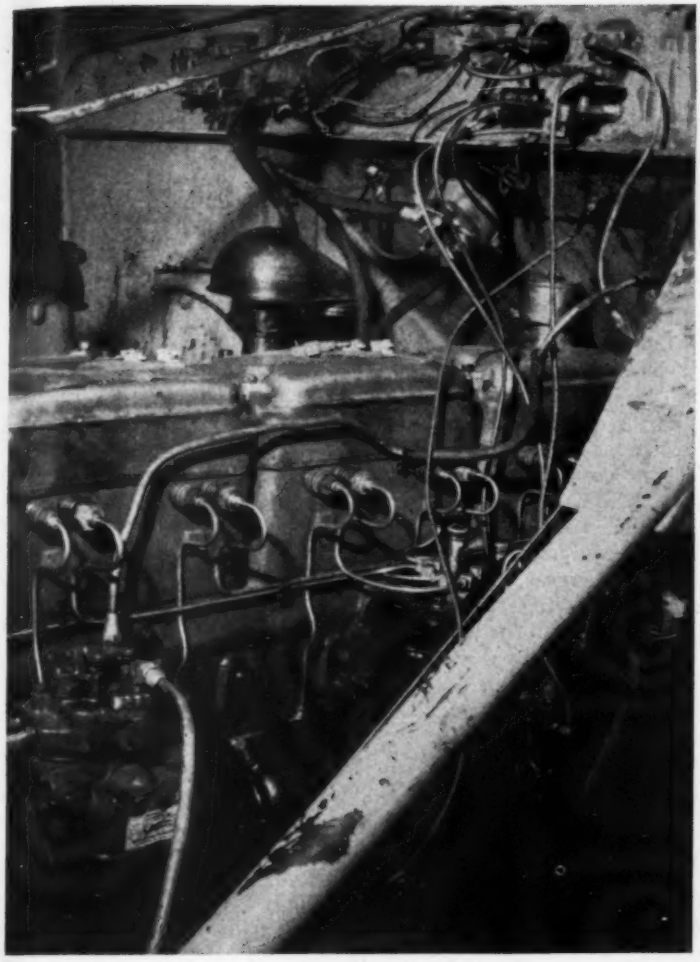
This overhaul job, which took only a few days in spite of parts delays, came along midway through a winter in which the shop men had already turned out two other Euclids, 4 Caterpillars, 5 Internationals, 3 pick-up trucks, 4 shovels, 2 cranes, 2 Koehring dumptors, 2 Mack trucks, 2 International dumps, and a flock of water pumps, light plants and lesser items.

In Codell shop foreman J. E. Hunter's words, "We'll be glad to get back to normal some day. From a strictly money standpoint in an outfit like ours, a part worn enough to take off

(Upper) Installing new body hoist unit, aided by two electric chain hoists

(Middle) A lot of welding footage was required to put a new bottom pan in the dump body. White lines show some of the welds

(Lower) The overhead crane made easy work of setting the body back in place. Another overhaul job done in "nothing flat" by Codell's shop veteran crew



Oil-gauge and hydraulic lines in many cases including bronze fittings were rebuilt in the shop

Bolts and nothing but bolts! Codell's shop men can find the size and type they need in a hurry, thanks to well marked bins

usually isn't good enough to save and reuse." But right now Codell's men are salvaging a good many worn parts and contributing as much as possible to the war conservation.

▼

Electric Motor Enemy No. 1 Is Dust

Allis-Chalmers Mfg. Co., Milwaukee, Wis., in its "Guide to Wartime Care of Electric Motors," reminds that the time to catch dust is *before* it has had a chance to unite with water or oil to form a gummy mess. That means wiping off the motors on *regular* inspections — housings, slip rings, commutators—and occasionally blowing dust out of the wound section with a fairly low pressure (not over 40 lb.) compressed air, or hand bellows.

Be sure this air contains no grit, metal or moisture. If there is danger of blowing abrasive or conductive material in to the air gap or windings, section cleaning may be preferable.

Keep dust from bearings by seeing that oil filler caps are always closed, dust seals and gaskets in good condition. Dust is a ruthless enemy of electric motors requiring constant attention in maintenance.

▼

Storage of Recappable and Repairable Truck Tires

By L. H. TAYLOR
Truck and Bus Tire Department,
The B. F. Goodrich Company

While it is true that tread, sidewalls and outer rubber cord covering the inside of a tire help protect it from water, almost all truck tires worn to where they should be recapped have been cut or punctured so that moisture can enter and damage the cords. Most repairable truck tires can be so damaged.

Moisture entering the tire in this manner may reach a point some distance away from the injury since it will travel along each cord much like water entering a tree at the roots. When the tire is then sent to the recapper or repairman, it is seldom that all of this moisture can be taken out of the tire by heat before the work is done, the result is a recap failure later. While some recappers have drying rooms, moisture deep into a tire is almost impossible to eliminate. Most recapping plants do not have drying rooms.

Rules on storage of new-tire storage apply to tires being saved for recapping or repairing.

Light—Storage room should be dark, at least, no direct sunlight. Any windows should be painted with blue paint, to allow soft indirect lighting.

Temperature — Low temperatures are not objectionable, but temperatures over 80° F. are detrimental and should be avoided.

Oil—Tires should *not come in contact with oil in any manner.* A common failing is to lay them on oil-soaked floors. Oil, a natural enemy of rubber, causes it to disintegrate rapidly. An oil-soaked tire recapped is more likely to fail.

Moisture — Moisture should be avoided, tires stored indoors out of the weather. Be alert for a leaky roof, water pipe, or other source of moisture.

Air—A strong air current should be avoided; increases oxygen supply and deterioration.

Cleaning Contractors' Equipment

How to use emulsifiable cleaner and compounds now available to remove cement, strip paint, prevent rust in storage, control sludge

By DR. R. W. MITCHELL
Technical Director, Magnus Chemical Company, Garwood, N. J.

IN 1944 it is going to be more necessary than ever to set up a tight preventive maintenance program for all kinds of contractors' equipment, such as rollers, bull-dozers, cement mixers, compressors, shovels, dredges, hoists, derricks, etc., etc. Otherwise, too much needed equipment will be out of service for needless repairs or, even worse, rendered useless by breakdowns which could have been caught in their incipient stages with the proper preventive program.

This paper covers the vitally important part that effective *cleaning* of equipment plays in such a program. You cannot have an effective system of preventing breakdowns by routine inspection, adjustment and repairs unless you have first solved the problem of getting a *clean unit, assembly or part to work on.*

Also cleaning makes it possible to put into storage units thoroughly cleaned and hence not open to attack from corrosion and other sources which work best on neglected and dirty machines.

Removal of Gravel, Mud, Clay, Oil, Grease, Etc.

Thorough, speedy cleaning of the great majority of contractors' equipment of all kinds is readily accomplished with an emulsifiable cleaner. Many contractors are equipped with steam cleaning systems, using various types of alkaline cleaners for this operation. There is nothing inherently wrong with the use of the steam gun and the right type of alkaline cleaner, but the emulsified cleaner is much speedier, considerably lower in cost and does a much better cleaning job. It also leaves all surfaces that have been cleaned in ideal condition for re-painting or for precautionary rust preventative treatment for storage.

Emulsifier Cleaner with Steam or Vapor Equipment

In using emulsifiable cleaner, one very satisfactory method is open to those who have a steam gun or vapor cleaning system. Use the usual mixture of the concentrated emulsifiable cleaner with kerosene or safety solvent in the proportion of 1 part concentrate to 6 parts kerosene (or 1 to 8 for some none-too-dirty jobs). This mixture is sprayed from a portable spray outfit, or brushed or sponged on all surfaces to be cleaned and allowed to soak in for about 15 min.

Then all surfaces are gunned off with steam, using no cleaner solution in the steam gun. This is the speediest and by far the most satisfactory method of cleaning equipment now available. All dirt, grease, mud, clay, etc., is removed, leaving clean, dry surfaces which need no further treatment for indoor housing or storage. Repainting, if required, can be started at once, without other cleaning, unless paint coats already applied makes stripping advisable. For outdoor storage rust-protection treatment is desirable.

Hot Water Method

The emulsifiable cleaner operates by penetrating dirt deposits, loosening the bond. It does not dissolve the dirts, but when steam or water is used to flush, the cleaner forms an emulsion with the water to suspend and carry away all dirt.

If no steam gun is available, hot water under pressure is almost as satisfactory. It cleans just as thoroughly and leaves the equipment dry. Where hot water cannot be obtained, tap water will do just as good a flushing job, since this type of cleaner is designed for use at room temperature. Equipment will not dry off as rapidly, but any slight surface rusting is not serious.

Emulsifiable cleaner methods are particularly well suited for crawler treads and under-gear, and for gas and diesel engines prior to inspection and repair. It should be noted that carelessness in cleaning of your equipment is not only going to cause speedier wearing out, but leads to all sorts of needless major repair work. A clean piece of equipment can be thoroughly inspected. Incipient failures or the beginnings of troubles are more easily spotted and remedied.

Removal of Cement

The cleaning method discussed above will not remove cement unless recently deposited and not hardened. However, cement can be quickly and easily removed from your equipment by using a special inhibited acid cleaner. This type of cleaner, originally designed to clean out cooling systems of gas and diesel engines, is based on the fact that hard water deposits in radiators and motor blocks are not touched by alkaline cleaners. Acid is needed to dissolve them. Yet acid cannot be safely used on metal without serious danger of corrosion and damage. The answer is the inhibited acid which forms the basis of the cleaner mentioned above. Its ability to dissolve lime deposits (as well as cement) is not affected, but the inhibitor used prevents its having any harmful effect on metals.

This cleaner is brushed or sponged on and allowed to soak in for about half an hour. The cement then will usually chip and scale off readily when surfaces are tapped with a hammer. A second treatment may be required.

The only precaution necessary after using this inhibited acid type of cleaner is thorough rinsing. Be sure that you rinse well after any use of this cleaner.

Cleaning Parts and Assemblies

Many parts and assemblies need good cleaning before maintenance or repair work. You get good results from a hot alkaline cleaning tank, if you have one. Or else the steam gun can be used on larger assemblies.

However, the most satisfactory method of cleaning such parts and assemblies is the use of the same emulsifiable cleaner described above.

In shops where handling a considerable volume of cleaning, an alkaline cleaner solution in a hot tank maintained at boiling may be found satisfactory, if care is taken to use a cleaner which is not too alkaline and which is properly compounded to yield additional alkaline action as dirts and greases use up the immediately available alkalinity of the solution. Caustic soda and similar strongly caustic solutions should not be used for such hot tank cleaning. They are not only hazardous, but are actually very poor detergents, and difficult to rinse off.

Stripping Before Repainting

Where old paint coats have to be removed prior to painting, the use of

caustics is to be avoided for much the same reasons. A caustic softens the paint from the outside in and does an all around poor job, involving a great deal of scraping and elbow grease.

A modern paint remover, designed to penetrate rapidly down to the metal, causes the paint to strip off in sizable flakes, and when the proper type is used, the surfaces can be stripped with a steam gun, or high pressure water.

The surfaces to be stripped are covered, working from the bottom up with a hot solution of this type of cleaner (thickened if need be with corn starch to insure its retention on vertical surfaces). After soaking in, the surface is flushed with a steam gun or pressure water, which strips paint completely except where many coats have to be removed, when more than one application is needed.

Rust Protection

If cleaned units are to be stored or exposed to weather for any extensive period, rust protection is advisable. A simple, economical method consists of spraying with a thin commercial fluid which has the property of quickly evaporating, leaving an adhesive and permanent protective film. This fluid is available as a concentrate and can be cut with kerosene up to 50%.

Sludge Control in Gas and Diesel Motors

Although there are detergent treated oils on the market for the control of sludge formation, even these oils will form sludge under certain service conditions. Untreated oils, no matter what their quality, will form sludge in any gas or diesel engine. And sludge, whether of the hard or soft variety, is one of the most consistent sources of motor troubles (though many operators of automotive equipment do not realize it). Sludge clogs small and narrow lubricating passages. It makes for sticking rings and valves, often to the extent of ring seizure and serious damage. It reduces the power of a motor and causes excess fuel and oil consumption.

It is good practice to purge your motor and crankcase of sludge by using the proper addative in the lube oil, running on the job as usual for 400 or 500 miles with this purging concentration in the crankcase. During this period the sludge is loosened and dispersed throughout the oil so that when the case is drained all harmful sludge is removed.

Purging can also be done in the shop by using the addative straight without oil in the drained crankcase. In this case a few hours will suffice.

Once a motor is purged, further sludge formation can be prevented by using this addative in smaller proportions, adding a specified amount for each quart of fresh crank case oil.

Choice of the proper addative is of course important. You want one that is definitely designed for inhibiting sludge formation and which has a suitable penetrating and coating quality. It also should have the property of dispersing sludge as fast as it forms throughout the body of the oil, where it can do no harm if kept dispersed. Finally, it should be able to similarly disperse water of condensation in a finely divided form, since this water is one of the most common sources of sludge.

Most fleet operators prefer using an addative to meet various conditions of service, rather than a treated oil available in but a single concentration of detergent.

Incidentally it should be noted that this same type of addative, because of its property of clinging to metal surfaces, offers an excellent means of preventing sticky rings and other troubles due to lack of use on stored or idle motorized equipment. Its use for this purpose is simple. On gas engines, you add the required amount to the gas tank as well as the crankcase and operate the engine for 30 min. before storing. On diesels, the same treatment is given, and repeated after storage.

Motors thus treated are quick to start and on inspection show no harmful effects of long idleness or storage.

Also this addative acts as an effective penetrant for starting rusty nuts, bolts, etc. It is mixed 50-50 with No. 10 oil for this purpose and used like any other penetrating oil.

Painting Snow Fence by Dipping Method

A labor-saving method of painting snow fence has been developed by Sylvester Mazella, Equipment Inspector, Charleston District, State Road Commission of West Virginia. A small winch capable of lifting the rolled bundles of fence is rigged up in the front end of a truck. At the rear end is an old leakproof gasoline drum, wider than the roll of fencing and about 2 ft. higher. The mixture of creosote and paint is placed in this container. The winch picks up the rolled bundles from the ground and drops them into the container. After the dripping and drying process has been completed, the rolls are placed on the ground in rows. The loss of paint has been negligible as the bundles are held directly above the paint receptacle until completely dry. Only two men are required to handle the operation.

Tire Saving Hint

Don't let valve on inside dual touch brake drum. Drums get hot—often reach 450° to 500°—sometimes higher. If valve touches, it carries heat direct to tube and tire. Heat in tire can cause failure.

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Sharpening Power and Hand Reel-Type Mowers

By K. E. GOIT
Sales Manager, Toro Manufacturing Corp., Minneapolis, Minn.

THE repairing of mowers is more or less a routine process that can be done by almost any mechanic, until you get to the sharpening operation and that takes a skilled operator who understands what it's all about.

The art of sharpening mowers varies but little between the various reel types. The two methods commonly used are the lapping process, where the reel blades are reversed against a tightened bed knife on which has been applied a solution of emery and oil, and the orthodox means of using a dry emery wheel grinder. Of course the mower has previously been thoroughly cleaned of all loose particles such as glass clippings, dirt, grease, and foreign objects of any kind.

The best method of cleaning is live steam. Next best means are: a compressed air hose, using at least 50 to 75 pounds pressure; gasoline; hot boiling water with an alkali solution; or a wire brush with "elbow grease."

After cleaning, place mower on a level floor or bench and make sure that the bed knife is lightly tightened uniformly all the way across the revolving reel.

Lapping Process

This is your most important adjustment and must be carefully done. The whole success of the lapping-in process or sharpening depends on the care used in making the initial adjustment of knife to reel blades, and unless it is done carefully,—chances are taken that one side will become out of alignment—then the mower will cut lop-sided from that time on unless the reel is reground completely on an emery wheel.

Now, after the bed knife has been carefully adjusted as outlined, and slightly tightened against the reel blades—and taking it for granted that the user has the prevailing type of stand with an electric motor on it, used for lapping mowers— the next step is to remove the right hand-drive wheel and the plate which covers the right hand reel bearing; lift the mower into the stand, see that it is lashed securely, and engage the hexagon socket on the drive shaft chuck over the nut on the end of the reel shaft which is now exposed.

Now, after the bed knife has been carefully adjusted as outlined, and slightly tightened against the reel blades — and taking it for granted that the user has the prevailing type of stand with an electric motor on it, used for lapping mowers—the next step is to remove the right hand-drive wheel and the plate which covers the right hand reel bearing; lift the mower into the stand, see that it is lashed securely, and engage the hexagon socket on the drive shaft chuck over the nut on the end of the reel shaft which is now exposed.

You are now ready for the grinding compound to be applied—and this consists of No. 120 fine emery mixed with a can of oil to a consistency approaching a paste. Apply this emery and oil solution with a small paint brush directly to the individual blades, not heavily but lightly — and take special pains to see that none of it gets into the exposed reel bearing.

Two small rags tied around the end of the reel shaft on the inside and pushed tight against the mower side plate, will be extremely helpful.

Now apply the power to the electric motor—and the RPM of the reel as it is reversed against the bed knife should be 300 to 350. Don't run faster than this speed, and make sure that the stand is properly bolted to the floor or securely held so there is no jiggling motion.

Fifteen to 20 minutes of lapping-in should be enough to renew the cutting edges of the blades. Then the mower should be taken off, cleaned thoroughly with gasoline—with particular pains used around the shaft where it enters the bearings. After the drive wheel has been replaced, put the bearing plate cover back in position and clean the mower off. Then adjust it carefully, using narrow strips of paper to test the uniformity of cut all the way across the knife. That completes the operation.

When Emery Wheel Grinder is Used

When a revolving reel has been knocked out of true by hitting sticks and stones, a dry or wet emery wheel grinder must be used rather than above process.

If the mower is taken down completely it is best to remove revolving reel and hold it on centers against the wheel. If the blades are badly bent, put them on a flat plate and straighten with a blunt hammer before placing them against the grinding wheel.

For a thorough job, first grind the reel cylindrically so that each blade is accurately sized with the other blades. In using the pressure of the wheel against the blade it is important to see that it is carefully adjusted so that not too much of the wearing surface is ground off. An emery wheel improperly used will shorted the life of a revolving reel by a year or two—and no unskilled man should ever be given the job of sharpening mowers with an emery wheel grinder. A factory man doing this work is highly skilled and anyone doing this work should have a thorough knowledge.

When the cylindrical grinding has been completed, and all blades are accurate in relationship to one another, blades should be backed off from 20 to 30 degrees, leaving a narrow edge of cylindrical grinding untouched. Be careful to see that bearings run true in shaft centers at time this work is done—and cylindrical grinding alone without backing off, is superior to backing off without first trueing off.

Your bed knife should be accurately ground, and to accomplish accurate grinding be sure that the grinder is firmly bolted to the floor. Any vibratory movement, regardless of how slight, is detrimental to the proper functioning of the machine and is apt to cause a wavy action in either the reel blade or the bed knife.

Now, having completed the grinding operation, re-assemble the mower and adjust the bed knife so that the revolving reel just grazes it by perhaps .001 or .002 in. Take the strips of newspaper, turning the reel slowly by hand to make sure it cuts all across the knife and your job is done.

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STULZ-SICKLES CO.
NEWARK, N.J.

ARBA Conference

(*Continued from page 70*)

Among the directors, term expiring 1944, C. H. Buckius, chief engineer, Pennsylvania highway dept., and Samuel C. Hadden, Indiana highway commissioner, were newly elected, and five were re-elected: James C. Alban, Alban Tractor Co., Baltimore; M. J. Hoffman, Minnesota state highway commissioner; Frederick Hoitt, Sec'y, New England Road Builders Assn., Boston; E. L. Roettiger, state highway engineer, Wisconsin; and ARBA engineer-director, Charles M. Upham. A 1946-term director, Paul L. Griffiths of Koppers United Co., Pittsburgh, was succeeded by A. R. Taylor, construction engineer, same company.

Four division vice presidents were also re-elected: E. R. Galvin, LeTourneau, (mfrs. div.); R. B. Travers, county highway supt., Onondaga County, N. Y. (county div.); R. W. Gamble, supt, of street cons. and repairs, Milwaukee (municipal div.); and James J. Skelly, of James J. Skelly Co., Media, Pa. (highway contractors' div.).

Bartlett Award to Mattimore

At the annual banquet at which Capt. Don S. Knowlton, USNR, was the guest speaker, H. S. Mattimore, long with the Pennsylvania department of highways and more recently with the Navy Bureau of Yards and Docks, was presented with the George S. Bartlett Award for distinguished contribution to highway progress.*

For 40 years, Mr. Mattimore has taken an active interest in the improvement of highway construction He is recognized internationally as the dean of testing engineers. In presenting the Award attention was called to his ceaseless energy as evidenced by his work through research and scientific groups which include the Highway Research Board, of which he has been chairman, and ASTM, AASHO and ASCE with which he has served as chairman of special research committees.

A. E. O'Brien, managing director, ARBA contractors' division, presented a charter to the newly formed Virginia Roadbuilders Association, Kenneth L. Black of Richmond, president.

S. F. Beattie presided over an uproarious Old Timers' Shindig at which George L. Earle, son of Horatio S. Earle, ARBA founder, read a history of early days.

*Award established by friends of George S. Bartlett, famed as booster for better highways since "horseless carriage" days. Mr. Bartlett, although 85 years old, is still active in the promotion of better highways. The annual recipient of the Award, a large metal plaque, is selected by the Presidents of the ARBA, AASHO and the Highway Research Board.

Compactly designed to work fast in close quarters and ruggedly built to assure low-cost, dependable performance, Insley Excavators are demonstrating their value to the army engineers and seabees in many ways on many fronts. That's why all Insley production is now earmarked for front-line duty.

But when this war is won, there'll be plenty of Insley equipment for your jobs. When the day comes, we believe you'll agree with the men of our armed forces who are today learning that Insley equipment does the job right . . . *and right now!*

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INSLEY
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(*Continued from page* 50)

A. E. D. Previews Kennedy's Safety Foundation Report

That post-war planning for new and improved highways must be based on need, rather than geographical considerations, is emphasized in a preliminary report of the Automotive Safety Foundation, presented by G. Donald Kennedy.

Based on a 6 months' survey this report shows that 86% of all traffic moves over only 25% of the roads, and that these roads, many being part of the 33,000-miles inter-regional highway system, must be cared for first in the post-war period.

Other facts brought out:

(1) The federal government has spent over $4,000,000,000 in federal aid for highways since 1916, but "The role of the federal government in highway development is now, for the first time, being seriously questioned in Congress."

(2) Federal aid has helped improve 159,000 miles of our national system of 231,000 miles, but the average life of all pavement is only 12 years; much is now obsolescent.

(3) An upturn in highway accidents and fatalities is expected in the post-war period.

(4) The passenger car is a utility rather than a pleasure vehicle—77% of all trips are for business and 90% are less than 30 miles.

The Foundation's report will be presented to the U. S. Senate subcommittee on highways (Sen. Carl Hayden of Arizona, chairman) and is expected to influence post-war planning for roadbuilding.

Post-War Equipment Changes

Barney Devine, of Chain-Belt Co., discussed new equipment design, reminding that distributors can help manufacturers because they are most familiar with the user's problems and needs. Lower cost operation will be the primary post-war aim in considering equipment advances. Efficient factory production to get lowest selling price will be sought. Streamlining equipment for appearance, while it will not be overlooked, must be secondary. He sees a definite place for lighter weight equipment, through alloy steels, etc.

E. R. Galvin, LeTourneau, gave an inspirational paper in which he called for the construction machinery industry to tackle the after-war task with nerve, venture, vision of big things, new concepts. In this vein also W. B. Greene of Barber-Greene reminded that the distributor's real job is the imaginative one of finding users who can profit by a given machine.

Banquet Honored Founders

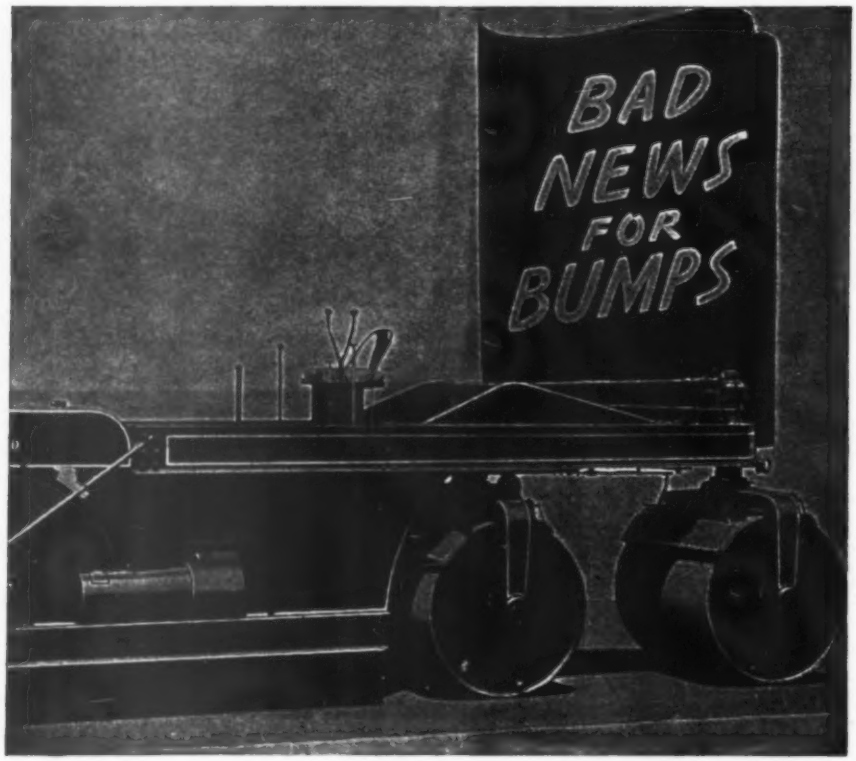
The A. E. D.'s annual banquet, with President Ed. P. Phillips "MC"ing, paid tribute to the twelve founders, of whom eight are living: J. S. Beckwith, Beckwith Machinery Co., Pittsburgh, Pa.; C. G. Borchert, Borchert-Ingersoll Co., Inc., St. Paul, Minn.; M. R. Hunter, Hunter Tractor & Machinery Co., Milwaukee, Wis.; W. B. Louer, Santa Barbara, Calif.; K. B. Noble, K. B. Noble Co., Hartford, Conn.; F. W. Swanson, Globe Machinery Co., Des Moines, Iowa; Wm. H. Ziegler, Wm. H. Ziegler Co., Inc., Minneapolis, Minn.; Dan M. Edgerly, Interstate Machinery & Supply Co., Omaha, Neb.

▼

Reports Tazewell Ellett, Henrico County Engineer, Richmond, Va.:

Our plans and estimates for post-war work, in course of preparation, will include road reconstruction, bridge replacements, sewer and water service systems and disposal plants. Our annual program cost will probably be: construction, $100,000; maintenance, $100,000; bridges, $50,000; other purposes, $100,000.

This can be compared with 1941 expenditures of construction $80,000, maintenance $75,000, bridges, $5,000.



The Buffalo-Springfield 3-Axle Tandem is definitely "bad news" for bumps. For the present, these unique rollers are in service on many fronts, building airport runways and military roads. After the war they will be available for the great peacetime public works program.

THE BUFFALO-SPRINGFIELD ROLLER CO., SPRINGFIELD, OHIO

BUFFALO-SPRINGFIELD ROLLERS

MEETINGS AHEAD

Feb. 28 - 29 - March 1, Michigan Highway Engineering Conference, Grand Rapids, Mich.

Feb. 23-24, First Illinois State Asphalt Conference, Hotel Abraham Lincoln, Springfield, Ill.

March 10-11, Fourth Annual Short Course on Roadside Development, Ohio State University, Columbus, O.

▼

Developments on Post-War Front

Galveston County, Texas, has applied with the Texas highway department for county road improvements to cost $3,000,000. These comprise five projects, in addition to the Galveston-Houston superhighway for which the county will begin to acquire right of way as soon as the route is designated.

* * *

The Harper-McGraw route, so-called, of the Detroit cross-town highway has been designated as post-war project No. 1 for Detroit by Michigan state highway commissioner Charles M. Ziegler. The cross-town route will be of limited access design, partly elevated and partly depressed, leading from a junction with the Detroit Industrial Highway at Wyoming Ave. to a terminus on the East side of Detroit. City, county, state and federal funds will figure. Additional survey parties are being added to expedite plans preparation.

* * *

Washington, D. C. after the war may replace the 4-lane highway bridge across the Potomac with a modern 6-lane structure of single span. This project has been recommended by the National Capital Park and Planning Commission. $50,000 is available for working plans subject to approval by the D. C. Dept. of Public Works and the Public Roads Administration.

* * *

Soil Stabilization with Resin

According to notes on road research issued by the British Road Research Laboratory, promising results are being obtained on a method of stabilization in which resins or special chemicals are used as "waterproofing agents" for soils that are mechanically stable. The function of the resin is to keep the moisture content of the soil constant at the optimum value. Small quantities of resin (1 or 2 per cent) are required.

ANY set of worn shovel track pads can be reclaimed with ordinary electrodes at considerable savings over new pad cost—and usually with a 100% increase in pad life. But when worn pads are hard-faced with Stoody Self-Hardening, *you really begin riding on velvet!*

First, there's a whale of a difference between wear resistance of Stoody Self-Hardening and the best high carbon steel you can buy. *One application of Stoody Self-Hardening actually outwears two of high carbon!*

Second, it takes no more time or material to apply Stoody Self-Hardening—and the alloy's original cost over high carbon is negligible compared to results.

And last, you save the down time and cost of one complete overhaul. No wonder we say you're riding on velvet when you use Stoody Self-Hardening!

300 lbs. of 3/16" Stoody Self-Hardening at 50¢ per lb. f.o.b. Whittier, California, is ample to repair all pads on a 2½ or 3 yard shovel. Next time your shovel is down for repairs use Stoody Self-Hardening and watch the difference!

Have you received your copy of Stoody Specification Sheets? They illustrate and describe dozens of equipment-saving applications through the use of hardfacing—sent free on request!

STOODY COMPANY

1125 SLAUSON AVE., WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS

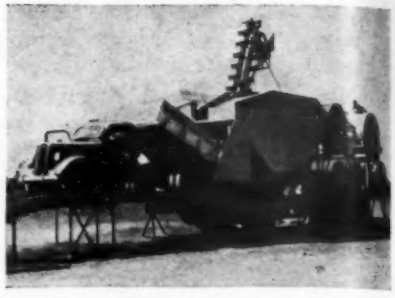
Retard wear . . . Save Repair

New Equipment and Materials

Portable Batching Plant

A highway portable batching plant has been brought out by the C. S. Johnson Co., Champaign, Ill. All materials are delivered to the batching unit in bulk material trucks.

A unique feature claimed for this Porto-Batcher is the Johnson charging skip. By providing proper intermingling of aggregate with cement when discharged into the mixer, this charging skip provides pre-mixing and pre-shrinkage which the manufacturer reports compares favorably with the best results of the best fixed batching plants. This feature, it is said, prevents cement from touching wet mixer opening and walls, thus eliminating gumming and excessive wear. This charging skip has a capacity of 43 cu. ft. . . . 33 cu. ft. for aggregate and 10 cu. ft. for cement. The aggregate from the three storage compartments reaches the skip through three fill valves. The cement and each size aggregate is weighed on a separate weight beam. The cement compartment is completely sealed to avoid contact of the cement with wet aggregate. The unit is easily towed behind a truck on its own pneumatic tired wheels. One man control of all batching operations by the ingenious grouping of all levers in one central location. The batching cycle is 90 seconds.



Johnson Porto-Batcher

BODIES and HOISTS LIKE THESE by HERCULES...

Hercules High Dumper
Power up, Power down

are giving maximum service with minimum expense, day after day, on the home front. "Victory is our business", and our war production is playing an important part in bringing victory nearer; but production for essential civilian use is also important, and we're able to make quick deliveries on many types of Hercules Hydraulic Hoists and Bodies to you.

See your Hercules Distributor, or send inquiries direct to us.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

Hercules Low-mount Sanitary Body

Hercules Braced Side Rub Rail Body

Hercules 6-Batch Coal Body

New Vibrating Screen

The Iowa Manufacturing Co., of Cedar Rapids, Iowa, now has on the market a horizontal vibrating screen for stationary and portable gravel plants, trademarked with their Cedarapids name, and stated to be the first full-floating screen with no transmission of vibrations to the subframe and with directional vibration forces that cannot become unbalanced. The motor, driven by a V-belt drive and replaceable by a countershaft, if desired, is mounted to one side of the frame on a detachable platform. A number of advantages are claimed for the screen: When installed on a portable plant, it gives complete access to either roll or jaw crusher by simply removing crusher hopper. Its use on a portable plant reduces to a minimum the weight added by such an installation. It operates flat, moving the material by the action of the screen rather than by gravity, and thus affording more accurate control over the screening. Its construction allows the piling on of material without injury to the screen cloth, which means more capacity. Furthermore, several elements of convenience, such as the ease and simplicity of installing a new section of screen cloth or rearranging the combination of sizes, and the fact that this type of screen saves headroom, enter into the situation in favor of the new screen. The screen can be installed in practically any plant, stationary or portable. Cedarapids horizontal vibrating

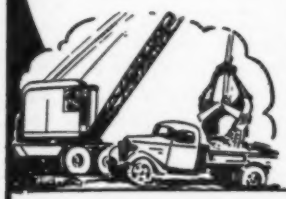
WELLMAN WILLIAMS TYPE BUCKETS

Staying Power

Wellman Buckets stay right in there slugging it out in the toughest, roughest going.

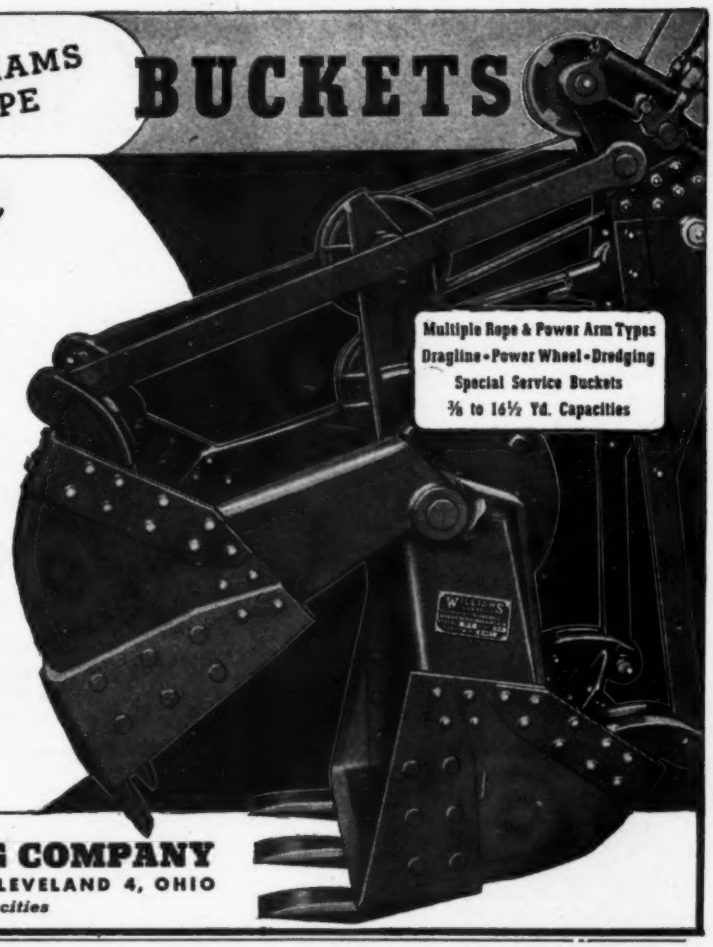
WELDED ROLLED STEEL CONSTRUCTION is one big reason for

LONGER BUCKET LIFE!



Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and special features in bulletins which clearly proves why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.



THE WELLMAN ENGINEERING COMPANY
7003 CENTRAL AVENUE CLEVELAND 4, OHIO
Sales and Service Agencies in principal cities

Calling all CONTRACTORS

ATTENTION

—to the fact that Perfection Truck Bodies have been rolling in unending streams into war-time service. And that when our vastly increased production facilities are once again devoted to normal production, Perfection will be found in its old place of LEADERSHIP IN VALUES—backed up with improved features that assure even better performance and longer life.

We hope that in a short time a tapering off of Government orders and restrictions may permit us to supply your requirements for Dump Bodies and Hydraulic Hoists, Stake Bodies and Special Purpose Bodies. Watch our ads for future announcements. Write for names and addresses of Distributors near you—also Bulletin and prices.

ARMY E NAVY

Keep Buying WAR BONDS and STAMPS

THE PERFECTION STEEL BODY CO. **Galion, Ohio**

PERFECTION

TRUCK BODIES AND HOISTS

screens are available in a variety of sizes, single, double, or triple deck, ranging from 2 ft x 4 ft. to 4 ft. x 14 ft.

▼

New Carrier and Erecting Unit for Ponton Bridges

In recent maneuvers the 22nd Armored Engineer Battalion built a 330 ft. bridge of rubber pontoons and steel in 3 hours and 2 minutes. This achievement was accomplished with the help of an entirely different equipment carrier and erecting unit, bringing into use longer, sturdier pontons, improved steel saddles, and wider treadways. The special steel carrier

A U. S. Army Engineer's heavy carrier with bridge building body and crane built by The Heil Co., Milwaukee, backs into position for unloading its cargo at water's edge

body and its 8,000 lb. capacity crane are specially built by The Heil Co., Milwaukee, Wis., for mounting on a Brockway Army truck. Each truck carries pontons, steel saddles, and four 2000 lb. treadways for 30 ft. of bridge. They are 31 ft. long, 9 ft. high, and weigh 26 tons loaded. The Heil-built crane is 14 ft. long, hinged at its base, and hydraulically controlled. Swinging from its traveling position along the outside of the body, it picks up the heavy steel treadways, two at a time, unloads and positions them for securing to pontons.

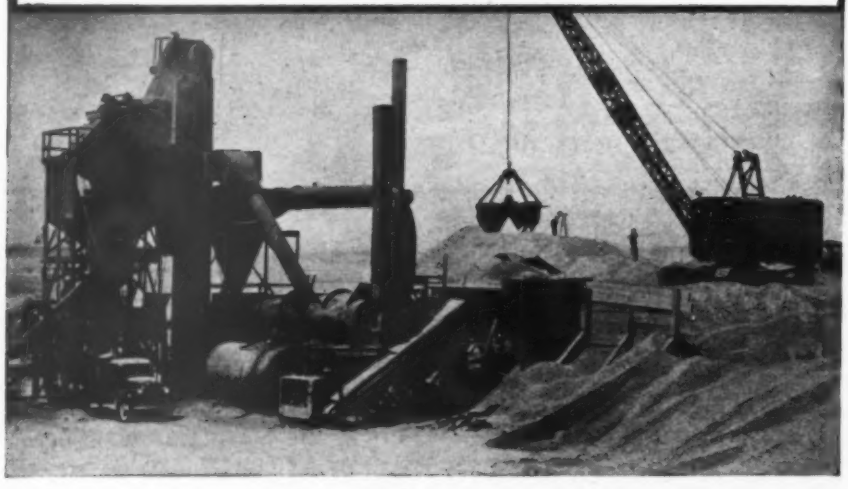
Another Heil-built feature of this big carrier is the 25,000 lb. double drum winch mounted just behind the front bumper. While winches are standard equipment on most large mobile Army units for pulling themselves or other equipment out of difficult spots, this one serves another important purpose. Sometimes it is necessary to position treadways from a high bank or cliff to a point lower than that attainable with the regular crane chains. The cable from the Heil winch is then treaded through a fairlead at the rear of the truck and through a snatch block fastened at the end of the crane's load chains so that equipment may be lowered far beyond the normal range of the boom.

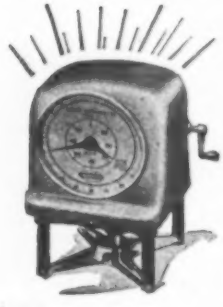
▼

Donald D. Kennedy, Jr., Now in Navy

Donald D. Kennedy, Jr., has recently left for Wellesley, Mass., where he will be inducted as a Lieutenant (jg) of the Corps of Supply, U. S. Navy. Mr. Kennedy has a long history and experience on the construction field ,and was head of the Kennedy-Cochran Co. of Chicago, which handled such accounts as the Buckeye Traction Ditcher Co., Iowa Manufacturing Co., Carver Pump Co., The Foote Co., Inc., and Worthington Pump & Machinery Co.

HETHERINGTON & BERNER
ASPHALT PLANT AVERAGES
Over 100 Tons Per Hour





THE
"Brass Brain"
(FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

• In spite of dust storms which necessitated frequent shut downs, this H & B asphalt plant did a real job for its owner, S. Birch & Sons Construction Co., of Great Falls, Montana, on a big northwestern air base project. For one five-day period the average hourly asphalt production was 115 tons.

This production is typical of the way in which H & B plants are helping speed the construction and maintenance of roads and bases that are vital to victory. Literature describing the complete line of H & B portable and stationary asphalt plants will be sent on request.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS 7, INDIANA

H&B
Hetherington & Berner

SHUNK

Specialist for 50 years in Manufacture of Grader Blades

SHUNK SAW TOOTH BLADE

Provides a positive practical method for eliminating traffic hazards resulting from ice covered or snow rutted highways and streets. The Saw Tooth Blade can be used on the maintenance unit, replacing the regular blade. The saw tooth blade quickly breaks up the ice or snow sheets. In addition rough rutted roads can be smoothed and leveled quickly, efficiently and inexpensively with a Shunk Saw Tooth Blade used as a scarifying unit.

Motor graders, snow plows, bulldozers, under-truck maintainers, road drags—practically any type of road maintenance unit can be equipped with the Saw Tooth Blade. The attaching holes are punched to fit any and all types of equipment and the blades are furnished in varying widths, lengths and thicknesses. No extra attachments are needed.

Since the Shunk Saw Tooth Ice, Sleet, Snow and Scarifier Blade can do so many different maintenance jobs and do them all quickly, efficiently and economically, it is an indispensable part of any street or highway set of equipment.

SHUNK GRADER BLADES

Shunk Blades are used on 80 percent of the Graders in use today.

The Blades are made from special refined high carbon plow steel, rolled to our own formula. They are forged at the edges and ends to add strength and fineness to the steel. They are accurately machined, shaped and inspected to fit the machines for which they are intended. They are scientifically manufactured to withstand the severe wear to which they are subjected.

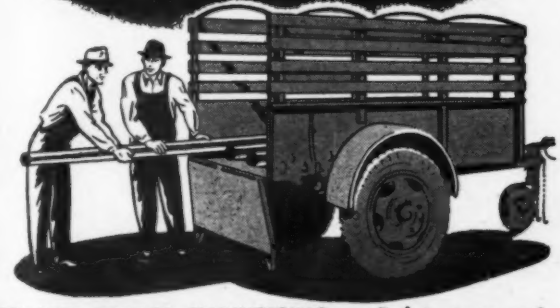
Reasonably prompt shipment is assured of various types and styles from stock carried at our factory for your convenience.

Full descriptive bulletins containing specific information on Saw Tooth Scarifier Blades and Grader Blades are yours for the asking.

SHUNK MFG. CO. **BUCYRUS, OHIO**

Established in 1854

Trailerize your operations for Time and Labor Savings!



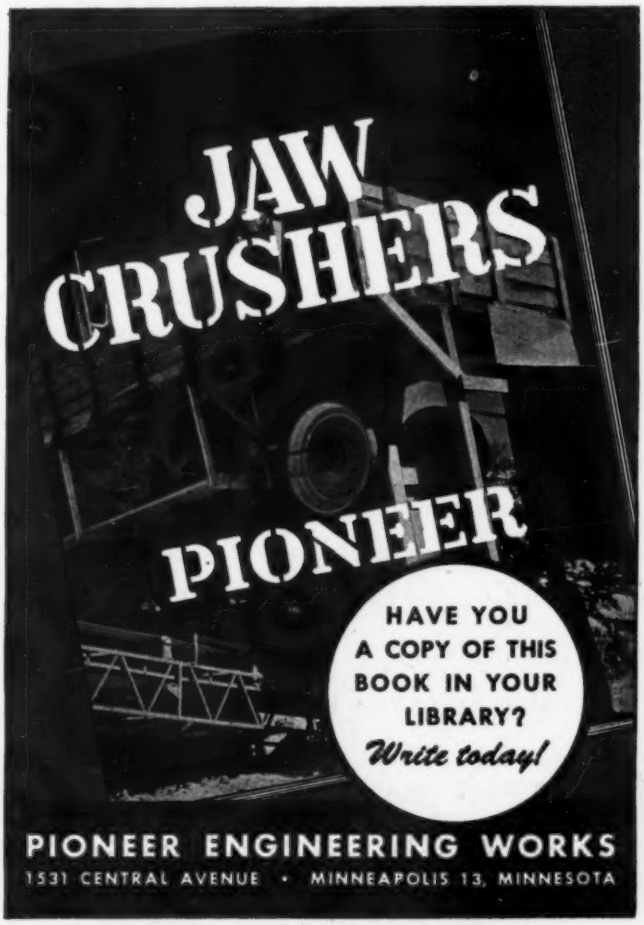
BEN-HUR TRAILER ENGINEERING applied to your post-war plans may show you many new uses for handy trailer units—to move tools to the job, to mount vital machine units, carry supplies and materials, or for mobile service units.

Take advantage of Ben-Hur's trailer designing experience. Write for our data sheet to aid your post-war planning.

ARMY E NAVY

BEN-HUR INDUSTRIAL TRAILERS

BEN-HUR MANUFACTURING CO.
634 East Keefe Avenue, Milwaukee 12, Wisconsin



PIONEER ENGINEERING WORKS
1531 CENTRAL AVENUE • MINNEAPOLIS 13, MINNESOTA

A booster hoist under *ANY TYPE OF BODY* spells **SAVINGS**

Saving Time in Production of War-Important

MAGNESIUM

Here's a time saving, money making combination: a special body mounted over a heavy-duty St.Paul Hoist.

American Magnesium Company of Cleveland saves many precious man hours in handling and *dumping* slag and foundry refuse with this booster hoist unit which also makes local deliveries of finished castings.

Please write us giving particulars of the essential work *you'd* like to use our booster hoist for.

Your stake or platform body can be converted.

BUY AN EXTRA BOND !

ST. PAUL HYDRAULIC HOIST COMPANY
2207 University Avenue, S. E.
MINNEAPOLIS 14 MINNESOTA

Photo recently taken when Major General Eugene Reybold, chief of U. S. Army Engineers, visited the Peoria, Illinois, main plants of R. G. LeTourneau, Inc.

Left to right, are: Col. Malcolm Elliott, of the U. S. Engineers district headquarters at St. Louis, Mo.; Elmer E. Isgren, general plant superintendent for LeTourneau's; General Reybold; Donn M. Burgess, executive v.p. and gen. mgr. LeTourneau, and Capt. Richard Krause, aide to General Reybold.

▼

Minnesota A.G.C. Meeting

Importance of adequate post-war construction planning was emphasized, and founders and past presidents of Associated General Contractors of Minnesota were honored at the organization's 25th anniversary Founders meeting in Minneapolis, Jan. 13-15.

LOOK TO BYERS EXCAVATORS FOR

OUTPUT

...to keep production on schedule and speed completion of airfields, military roads, strategic bridges, cantonment camps, powder and shell loading plants, storage depots and essential industrial expansion where earth moving or material handling is a problem.

WHEN THE WAR IS WON

Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

BYERS CRANES AND SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

CORONACH

"Of those immortal dead who live again
In minds made better by their presence."

K. I. SAWYER, Engineer and Superintendent of the County Road Commission of Marquette County, Michigan, since 1916, died last month at his home in Ishpeming, Mich. He was 59 years old. Mr. Sawyer was graduated from the civil engineering department of the University of Michigan in 1907. His first work was as draftsman for the American Bridge Co. In May 1908 he became assistant superintendent of the Menominee County Road Commission and in October of the same year was made superintendent. He held this position five years, going with the state highway department in May, 1913, and serving in Lansing until May, 1915, after which he was in charge of the highway department's first Upper Peninsula branch, in Escanaba. He remained there until Jan. 1, 1916, when he came to Marquette County as engineer and superintendent of the county highway department, a position he held until his death. Mr. Sawyer was the first to advocate a gasoline tax law for Michigan and submitted a bill for this to the legislature in 1919. He also was one of several engineers who independently developed the idea of the centerline marking for highways.

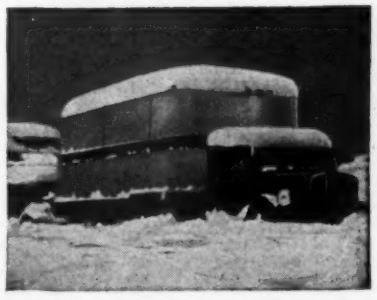
H. R. SEWARD, former city engineer of Waco, Tex., died Jan. 16 at his home in Waco, age 80. He was graduated from Baylor University in 1881 and had lived 37 years at Waco.

JOHN H. HOWARD, for more than 40 years a member of the civil engineering faculty at the Massachusetts Institute of Technology, died Jan. 25 at his home in Dedham, Mass. He was graduated from M. I. T. in 1903. He served as an engineering field assistant to a commission on water supply of New York City, and in September, 1903, joined the civil engineering staff at his alma mater as an assistant. Professor Howard was advanced to instructor in 1905, assistant professor in 1913 and was associate Professor of Topographical Engineering from 1922 until his death.

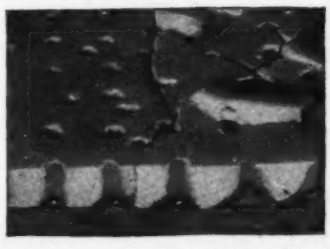
W. E. CALLAHAN, head of the W. E. Callahan Construction Co. of Dallas, Tex., died recently in that city, aged 61. He was engaged in highway construction in Texas for several years beginning in 1916. His later primary activity was the construction of levees and dams. Among his works, from 1931-33, were levees along the Mississippi from Natchez northward; the Mountain Creek Dam, built in Dallas for the Dallas Power & Light Company, the Nasworthy Dam at San Angelo and the All-American Canal of California, 1935-38. The Malden Dam (1931-35) in the Panama Canal Zone was built by Callahan Construction Company, as was the Outfall Sewer project at St. Louis. In 1941 his company was awarded a $7,000,000 contract for the construction of the Southwest Proving Grounds at Hope, Ark. At the present time his company is a part of the firm of Bechtel-Price-Callahan engaged on the Canal oil field and pipeline project in Western Canada.

GO

KEEP TRAFFIC SPEEDING
despite late winter storms!



You can't gamble on an early Spring! Weather records show late storms are often the worst of the year. But whatever the weather ...vital traffic must get through. Play safe... keep plenty of Sterling "Auger-Action" Rock Salt on hand. Applied early enough in a storm... it keeps snow and ice from packing and bonding to pavements—makes complete removal easy for bare pavement maintenance. Traffic statistics show bare pavements are safest. It takes 2½ to 7 times as long to stop a car on ice as on bare pavements!



Even if storms get jump on your men and equipment... Sterling Rock Salt will do a most efficient job. As model shows, the biting crystals of salt bore through like an auger ...melting hard-packed snow and ice, forming a brine which loosens the bond between them and pavement. Thus loosened and honey-combed, snow and ice can be easily removed by scraper and plow! Rock Salt snow removal treatments are economical. Furthermore, *straight* Rock Salt cuts maintenance costs by eliminating the necessity of cleaning streets and catch basins which ordinarily become clogged with sand and cinders during a thaw!

Sterling

"Auger-Action" ROCK SALT
FOR ICE PREVENTION

Write for bulletin containing all the facts on the most efficient and economical solution to your ice prevention problems. Free consultation with an International field engineer, upon request. Write to Dept. RS2, International Salt Co., Inc., Scranton, Pa.

With the Manufacturers

Promotions by Timken

Walter G. Hildorf has been appointed director of metallurgy of the Timken Roller Bearing Co. He is the first to occupy that newly created office. Hildorf was formerly chief metallurgical engineer, a position now held by Ralph L. Wilson. John E. Fick, superintendent of The Steel and Tube Division, is now vice president in charge of the same division. E. S. Hoopes, Jr., Assistant General Superintendent, has been appointed general superintendent of The Steel and Tube Division. A. M. Donze, factory manager for the past eight years, has become vice-president in charge of production. H. M. Richey, assistant factory manager, has been promoted to factory manager.

TROJAN

UTILITY PATROL

Fast and Dependable

● Road speed of 18 m.p.h. between jobs means a more productive day's work. Because of its outstanding design and construction features, TROJAN Patrol has proved out with lower all-over costs for road and airport building and maintenance. Write for details of Trojan construction and performance records. Address:

CONTRACTORS
MACHINERY COMPANY, INC.
Dept. RS-24 BATAVIA, N. Y.
Represented by The International Harvester Industrial Dealer in Your Community

TROJAN ROAD TOOLS INCLUDE: PATROLS, SELF-POWERED SPEED TAMPERS, DRAWN TAMPING ROLLERS, SCRAPERS

Bill Miles Honored

W. E. Miles, Industrial Sales Manager of the Cleveland Tractor Co., last month completed 25 years of service in that company. He was awarded Cletrac's 25-year service pin at an informal ceremony at the Executives Offices in Cleveland recently. Henry J. Leisenheimer, Cletrac's Vice President and Export Manager, who himself is a member of the select quarter century club, made the presentation. The Cleveland Tractor Co. was less than 4 years old when young "Bill" Miles packed his army uniform in moth balls and sold himself into a job with Cletrac way back in January, 1919. He has held practically every sales position the company has to offer and is known, respected and liked wherever crawler-type tractors are sold and used.

Bill Miles (at left) receives 25-year service pin from H. J. Leisenheimer, export manager and vice-president of Cletrac

Bill Miles served as a Director of the American Road Builders' Association from 1938 to 1940 and is a member of the War Production Board Advisory Committee in Washington and of the Crawler Tractor Industry Integration Committee coordinating efforts of the Military Service and the War Production Board. He lives at 3812 Monticello Blvd., Cleveland Heights, O.

Named Mack Vice President

Appointment of Henry Rowold as vice president of Mack-International Motor Truck Corp. has been announced by F. F. Staniford, president. Mr. Rowold joined the Mack organization in 1919 in a clerical capacity and later became executive assistant to the president. He was placed in charge of national account sales in 1939, and as vice president will continue in that capacity. He is also a committee member of the Central Truck Tire Rating Board of OPA.

Henry Rowold

THE OWEN BUCKET CO.
Breakwater Avenue Cleveland, Ohio
Branches: New York, Chicago, Philadelphia, Berkeley, Cal.

LOOKING AHEAD?
Include

TUTHILL GUARD RAILS
in Your Plans

IN facing the future and planning your Postwar Highway Safety Program, be sure to face the facts about why it will pay you to specify TUTHILL—the GUARD RAIL that stands straight as a sentry wherever installed.

TUTHILL *stands up*, and keeps *standing* for two valid reasons: First, it is struck less. Its convex surface is seen quicker, more clearly, at longer distances and under all weather conditions. Secondly, it is damaged less when struck. Its deflective action prevents serious damage. It saves more lives, permits less damage.

Standing—erect—trim—sentinel-like—undamaged—TUTHILL proves it withstands strains and stresses where they mean most, namely, *in actual service! Write for detailed specifications.*

Pacific Coast Manufacturers and Distributors
U. S. SPRING & BUMPER CO., LOS ANGELES, CALIF.

TUTHILL SPRING COMPANY
761 POLK ST... CHICAGO 7, ILL.

HANSON

TRUCK SHOVELS & CRANES
⅜ & ½ Cu. Yard Shovels
4 & 6 Ton Capacity Cranes

Full Revolving—Low Center of Gravity—Rugged—Flexible—Speedy—Safer.

Convertible to
Crane—Clamshell—Dragline—Pile Driver
Trenchhoe—Shovel

Plan Now for the Future
Write for Bulletin TSC.

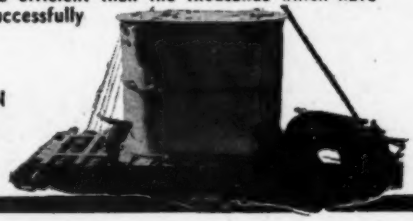
The HANSON CLUTCH & MACHINERY CO.
Phone 417 **Tiffin, Ohio**

SAFE from Invasion is no idle boast today. The enemy has been driven from the Alaskan outposts and they dare not attack us here!

ROGERS TRAILERS have played a big part in fortifying our coastlines and they are fighting with our men overseas!

on ROGERS TRAILERS

The ROGERS TRAILERS which will be available to industry when present war contracts are completed, will be even better-engineered and more efficient than the thousands which have been operated so successfully for many years.



ROGERS BROS. CORPORATION
ALBION,
PENNA.

EXPERIENCE *builds 'em* PERFORMANCE *sells 'em*

Harvester Advances Reishus

R. G. Archer, director of sales of International Harvester Co., announces the appointment of H. T. Reishus as assistant domestic sales manager, industrial power equipment. Appointed in a program to provide a more co-ordinated handling of industrial power equipment sales, Mr. Reishus will devote full time to furthering development and sale of Trac-TracTors and allied units.

Mr. Reishus started with Harvester in 1925 at Minot, N. D., and advanced through numerous posts, including a brief foreign assignment. In 1940 he was put in charge of used truck and tractor sales. In 1941 he became Eastern District manager and for a while served on war materials.

▼

Davis Joins Standard Steel

Grant Davis has been appointed sales manager of Standard Steel Corporation, Los Angeles, Calif., manufacturers of paving plants, batching equipment, sub-graders, finishers and other construction equipment. Mr. Davis comes to Standard Steel with a broad national experience, covering a period of 18 years in the construction field, gained principally through his association as general sales manager with the Shovel and Crane Division of the Lima Locomotive Works at Lima, O., and as West Coast District Manager with the Koehrin Co. at Milwaukee. Post-war plans are now being made to distribute Standard products nationally through established equipment distributors.

Grant Davis

▼

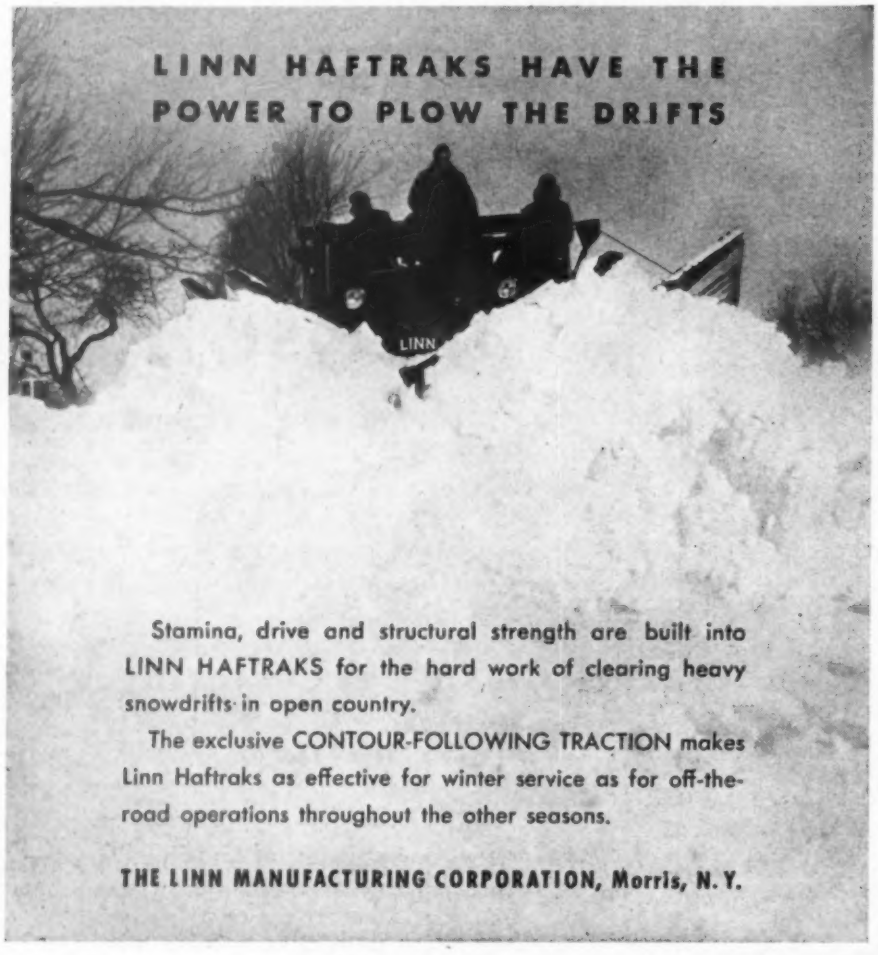
Wilson Is Worthington V.P.

William O. Wilson has been appointed a vice president of Worthington Pump and Machinery Corp. With office at Chicago he will be responsible for general supervision and direction of commercial activities in the Chicago, St. Louis, Kansas City and St. Paul district territories. Mr. Wilson has been with the organization and its predecessor companies for 45 years except for a two year period starting in 1911.

▼

Rosenbrock New Regional Manager for Fruehauf

A. K. Tice, General Sales Manager of the Fruehauf Trailer Co., has announced the appointment of Lloyd A. Rosenbrock as regional manager for the Southeast Division of the Fruehauf Trailer Co. Mr. Rosenbrock was formerly a distributor for Reo Motor Truck Co. and has had a long experience in the field of motor transport. His headquarters will be at the Atlanta, Ga., branch of the Fruehauf Company.


LINN HAFTRAKS HAVE THE
POWER TO PLOW THE DRIFTS
LINN
Stamina, drive and structural strength are built into LINN HAFTRAKS for the hard work of clearing heavy snowdrifts in open country.
The exclusive CONTOUR-FOLLOWING TRACTION makes Linn Haftraks as effective for winter service as for off-the-road operations throughout the other seasons.
THE LINN MANUFACTURING CORPORATION, Morris, N. Y.

HOW Important Are
WHEELS and AXLES
No matter how good you make your Portable Units, the user will not enjoy its ultimate satisfaction unless he can handle it speedily — efficiently — and with complete confidence.
That means that Wheels — good Wheels — are a vital part of your assembly. Let our Engineers show you how to make the most of the good Wheels we can produce for you. Write today for complete Illustrated Bulletins, covering wheels of every type — for every need.
EWC WHEELS
Electric Wheel Co., Dept. RS, Quincy, Ill.

ALL TRAILERS ARE NOT ALIKE!

Ask the salesman these questions:

- Are the beams strong enough to carry the rated load without sagging after several months' service?
- Does the frame have enough cross members?
- Are the bearings, axles and wheels of ample size and weight to carry the occasional overload and stand up under road shock?
- Are the radius rods, brake cross shafts and other points requiring lubrication bronze bushed?

These are just a few of the things to check before planning on your post-war trailer. But before you buy any trailer, check into the exclusive design of Jahn Trailers.

JAHN *Heavy Duty* TRAILERS
Capacities from 5 to 100 TONS

C. R. JAHN CO.
1345 W. 57th Pl., Chicago 9, Ill.
"Come to Trailer Headquarters"

For SEAL COATING and ICE CONTROL
with fewer men at less cost

The FLINK *Spreader*

The Flink self-feeding spreader is strictly a one-man outfit. Operated by driver of cab, who can throw spreader into action as he rapidly approaches, crosses and leaves intersection. Then it can be thrown out of action. Flink spreads forward or backward, full width of street, or less than half width. Handles sand, cinders, etc., up to 1" in size, wet or dry, spreading evenly up to 35' width. Does not limit use of truck for other purposes as Flink spreader fits on end as a tail gate. Positive agitation, no bridging. Flink spreader will pay for itself many times over the first year in labor saved, in extra yardage covered and reduction of complaints.

***The* FLINK CO.,** **STREATOR, ILLINOIS**

For particulars write our nearest representative:

WICO SALES
2924 N. Western, Chicago 18, Illinois

G. W. CLEMENTS
3050 Freemont St., Columbus 4, Ohio

TULSA MACHINERY CO.
Tulsa, Okla.

H. C. JORDAN
Irvington, Ky.

WISCONSIN OIL & EQUIPMENT CO.
34 Park Ave., Oshkosh, Wis.

GRUENDLER CRAFTSMANSHIP
Employed by U. S. A. in the WAR EFFORT

For Access Road and Air Base Construction

PORTABLE CRUSHERS

Proper Size Aggregates-on the Job

Balanced, Non-Tipping. Expertly designed to meet your exact requirements in proper size aggregates—larger capacity and quick mobility to and from job.

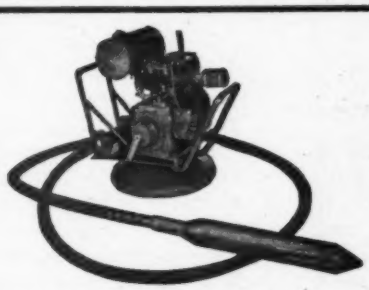
Four Wheel Maintenance JAW CRUSHER with Power Unit

GRUENDLER ENGINEERS

On the job to help you in any way, NOW and for your Post War Plans. Blue Prints or Practical Suggestions sent —No obligation.

Write for... Bulletins and Illustrated Catalog No. 601

GRUENDLER CRUSHER & PULVERIZER CO.
PLANT and MAIN OFFICE — 2915-17 N. MARKET • ST. LOUIS, MO.



Concrete
VIBRATORS and GRINDERS
Write for Circular on types, sizes and Prices

ELKHART **White Mfg. Co.** INDIANA

SILVER KING
HIGHWAY MOWER

● Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit ENGINEERED for the job. If you want replacement parts now to insure tip-top "good-as-new" performance *tomorrow*, write. We will be glad to serve you.

MANUFACTURED BY
THE FATE-ROOT-HEATH CO.
PLYMOUTH, OHIO

THAW CULVERTSAND HYDRANTS WITH AN AEROIL

No. 98 Portable Steam Thawer

A handy steam plant with a detachable thawing torch. Used by leading Highway Departments for Culvert Thawing. Special Culvert Nozzle (10 ft.) available. Send for WINTER CATALOG No. 234-S including Concrete Heaters, Portable Coil Water Heaters, Thawing Torches, Ground Thawers, Salamanders, Tar and Asphalt Heaters, etc.

1917-1944—27 YEARS OF SERVICE

AEROIL BURNER CO., INC.
5711 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan Illustrated CATALOG today.

VULCAN TOOLS — THE WORLD OVER — NOTED FOR QUALITY AND DURABILITY"

VULCAN TOOL MFG. CO.
QUINCY, MASS.

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U.S.A.

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers, Elevators, Screens, Sweepers, Wash Boxes, Bins, Pulverizers, Feeders, Spreaders, Kettles, Conveyors, Drag-Lines "GAYCO" Centrifugal Air Separators

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. N. Hopkins & Co., Ltd. 340 Canada Cement Co., Montreal, Que., Can.

Link-Belt Elects Vice-Presidents

W. C. Carter, president of Link-Belt Company, Chicago, has announced the election by the Board of Directors of two vice-presidents, effective Jan. 1, 1944.

E. L. Berry, vice-president and general manager of Link-Belt Ordnance Co., has been elected vice-president of Link-Belt Co., the parent organization. Mr. Berry, who began his Link-Belt career in 1914, has for many years devoted his time particularly to matters of production and personnel. His new headquarters will be at the company's general office, 307 N. Michigan Ave., Chicago.

E. L. Berry

Richard F. Bergmann, company chief engineer, has been elected a vice-president of Link-Belt Co., with headquarters at the company's general office, Chicago, as heretofore. Mr. Bergmann came to Link-Belt in 1924, through the purchase of Howe Chain Co., Muskegon, Mich.

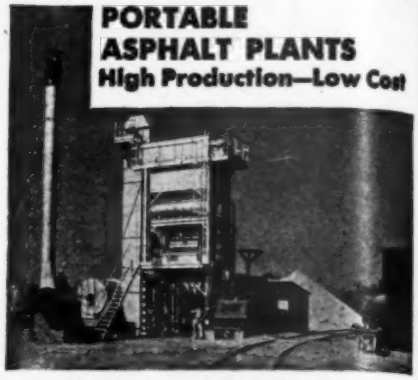
R. F. Bergmann

John E. Martin has been appointed manager of Link-Belt Ordnance Co., with headquarters at the plant. Mr. Martin started his Link-Belt career in 1927, and since Pearl Harbor has been assistant to Brigadier General G. M. Wells, War Dept., Washington, D. C.

J. E. Martin

Fruehauf Trailer Branch Moved

The Cincinnati factory branch of the Fruehauf Trailer Co. has been moved to new and larger quarters at 3126 Spring Grove Ave. The new branch is equipped to service all makes of trailers. The new branch, with 30,000 sq. ft. of floor space, is equipped with lathes, welding equipment, brake relining machines and a complete stock of trailer parts. A new paint spray booth has also been installed.



PORTABLE ASPHALT PLANTS
High Production—Low Cost

THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

Diamond Distributors Meet

From the United States and Canada, 65 distributors and salesmen of Diamond Iron Works, Inc., Minneapolis, Minn., manufacturer of construction and crushing equipment, attended an intensive two-day sales conference on Jan. 13-14, and heard details and witnessed operation of Diamond's new dual-action crusher. This new crusher combines the jaw and roll into a single machine.

Separate Motor Truck Division for International

The International Harvester Co. has created a separate motor truck division to have entire control of design, production and distribution of International trucks.

P. V. Moulder

P. V. Moulder, former assistant to the second vice president of the company, has been appointed general manager of the new International truck division and will report directly to the president of the company. Moulder's divisional executive staff will be composed of five managers, respectively directing engineering, manufacturing, supply and inventory, sales, and accounting. These managers are:

Manager of Engineering: W. D. Reese, formerly assistant to the vice president of engineering.

Manager of Manufacturing: V. A. Guebard, formerly works manager of the motor truck group of plants.

Manager of Supply and Inventory: D. A. Conroy, formerly a staff assistant in the motor truck group of the general office manufacturing department.

Manager of Sales: W. C. Schumacher, formerly manager of truck

sales and service for the company.

Divisional Comptroller: Glenn D. Wade, formerly assistant auditor of sales and collections in the general office accounting department.

Universal Atlas Promotes Wiggins and Bone

Universal Atlas Cement Co., United States Steel Corporation Subsidiary, has announced the appointment of Fred T. Wiggins, Sales Manager, Birmingham, as Assistant to Vice President, General Sales, New York, and the appointment of Robert H. Bond as Sales Manager, Birmingham, effective Feb. 1. Mr. Wiggins after attending The Citadel, Charleston, S. C., and graduating from Duke University, Durham, N. C., joined the sales department of Universal Atlas Cement Co. in 1926. Mr. Bond, after graduating from high school in Atlanta, attended Georgia School of Technology. He joined Universal Atlas Cement Co. as a salesman in 1927.

Dozer Dozes Japs

The effectiveness of American construction machinery, as an aid to military operations, has become legendary in this war.

Now stories are beginning to come back from the fighting fronts of bulldozers used as actual combat units. A letter to Buckeye Traction Ditcher Company from one of their men, now in service, said: "We had two pillboxes that were impossible to take; so, as they had a bulldozer about four miles away, we brought it up and by raising the blade, charged the boxes. You should have seen those little rats run. We are still laughing at the way they left here in such a hurry. Now let me tell you the strange part—on the side of the blade was 'Buckeye,' and a nice big winch on the back. We used the outfit to clear an air strip; so I'd say my peacetime employer is doing its part in sending things we need most."

Hughes New Advertising Manager for Cletrac

L. H. Hughes

A. L. Mercer, Vice President of The Cleveland Tractor Co., has announced the appointment of Leslie H. Hughes as advertising manager of that company. Mr. Hughes has been advertising manager of the Brown Fence & Wire Co. of Cleveland since 1939. Mr. Hughes attended the University of Minnesota and while in school worked on The Minnesota Daily as college editor. Mr. Hughes has been associated with Montgomery Ward, James Manufacturing Co., Sears, Roebuck & Co. and the Brown Fence & Wire Co. in advertising capacities.

Ahlers District Manager SKF

Robert R. Zisette, General Sales Manager of SKF Industries, Inc., Philadelphia manufacturers of ball and roller bearings, has announced the appointment of Walter C. Ahlers to the position of Detroit district manager to succeed Robert H. Hirsch, resigned. Mr. Ahlers has held the position of assistant district manager of the Detroit office.

Ault Now Sales Promotion Manager

Harry Ault, who was Advertising Manager of the American-Marietta Co. several years ago, has returned to assume the post of Sales Promotion Manager, it was announced today by Grover M. Hermann, President. Mr. Ault, formerly with the Lehon Co., replaces Bob Ornberg, who has been inducted into the U. S. Army.

HOST TO MOST Wartime WHO VISIT BALTIMORE

Baltimore is knee-deep in war! Surrounded by war production industries . . . located near the Washington scene . . . Baltimore has become a focal point of wartime activities. This has created problems . . . problems that you can help to solve. Make your reservation in advance . . . cancel it promptly if you cannot use it . . . be patient if the service is not as smooth and speedy as in pre-war times. As Americans we are proud we have these problems . . as hotelmen we ask your indulgence.

700 rooms—each with radio, tub and shower.

THE LORD BALTIMORE HOTEL

BALTIMORE-1 ★ MARYLAND

Rebuild your TRACTOR GROUSERS WITH BULLDOG Grip-Lugs

EASILY

WELDED

SEND FOR BULLETIN R-2

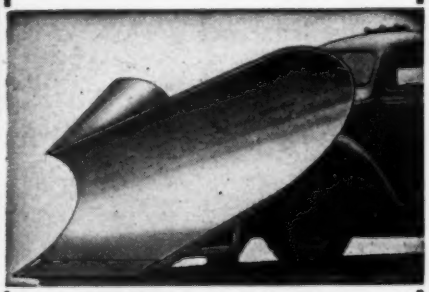
Increases Traction Efficiency.

A Quick and Economical Repair.

ALLIED STEEL PRODUCTS, INC.

NBC Bldg. Cleveland 14, Ohio

Root



Root V-type and Oneway Truck Snow Plows have helped to keep war industries, Army Camps and Airports open and will continue to do so.

Root has enlisted for the duration and is now running 100% for Victory.

ROOT SPRING SCRAPER CO.

Kalamazoo, Michigan

Builders of Truck Maintenance Equipment for more than 50 Yrs.

Clearing House

TRANSITS and LEVELS

New or Rebuilt
Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also *buy* your old instruments or take them in *trade*.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-92.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 N. 12th St. Philadelphia 7, Penna.

FOR SALE OR RENT

1—Used 1941—34-E Koehring Single-Drum Paver.
1—New—34-E Rex Dual-Drum Paver.

CHICAGO HEIGHTS COAL CO.,
27 East Nineteenth Place,
Chicago Heights, Ill.

ROAD CONTRACTORS

1—Centrifugal pump 1½", 5592 N. F. with built-in enclosed Fairbanks-Morse motor, type QSZS, 15 HP. 3 PH, 60 cy. 220/400 volts, 2 stage pump unit. (125 GPM. 180' head.)
1—Fairbanks-Morse, Centrifugal pump, type QSZS, 2" Suction, 1½" discharge, 7½ HP. motor, 3 PH., 60 cy. 220/400 volts, 3460 RPM., W. Allen Bradley starter switch, pump cap. 125 GPM. 180' head. Mounted on angle iron frame.
1—Allis-Chalmers Centrifugal pump, 2 stage, size 6x5 type HYC, GPM. 550, 300' TDH, RPM. 1760, inlet 6" discharge 5" w/direct coupled Allis-Chalmers motor, 125 HP. 3 PH. 60 cy. 440 volt, mounted on steel base.
1—Sullivan, 2 cylinder air compressor; 5½ x5½ WK-312 direct connected to Buda 4 cylinder gasoline engine mounted on 4 wheel truck.
3—C. H. & E. Mfg. Co., Triplex pumps 2½" intake 2½" discharge geared with clutch to 4 cylinder 4" bore-5" stroke Waukesha gasoline engines. Mounted on 4-wheel truck.
1—Adams Roadpatrol No. 41-Serial No. 1153 grader or planer made to hitch to tractor 6'6" blade.

Write, wire or phone
SONKEN GALAMBA CORP.,
Kansas City 18, Kansas

FOR SALE

Tanks

5—10,000 gal. & 12,000 gal. R.R. Car Tanks with coils.
4—15,000 & 18,000 gal. cap. horiz.

Pavers—Mixers

27E Ransome Dual Drum Paver.
34E Rex Dual Drum Paver.
2—27E Koehring 2A Pavers.
28S Ransome Elec. or Gas Mixer.
4—56S Smith 2 yd. Electric Mixers.

Asphalt Equipment

5—½ ton, 1 ton & 2 ton Asphalt Plants.
4—4x24, 5x30, 5x60 Rotary Dryers.
4—Kinney & Etnyre 1,000 gal. Distributors.
3—8 Ton & 10 Ton Tandem Rollers.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

POSITION WANTED

Position Wanted — Superintendent. Have 35 years' experience supervising and building all phases of Federal, State, Cities and Counties Projects, Airports, Highways, Bridges, Viaducts, Interceptor Sewers, Water Lines, Foundations and Flood Walls, Heavy and Light. Excavating. Familiar with all Government Project Construction. Qualification Unquestionable. Organizer and Estimator. Knows Cost. Age 52 years. Best of References. Address Box No. 25, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

Position Wanted

Asphalt Paving Superintendent, 32 years' experience. Prefers middle west states territory. Box 60, Roads & Streets, 330 So. Wells St., Chicago 6, Ill.

Asphalt Salesman to represent a manufacturer of asphalts and road oils in middle west territory. 30 years' experience. Box 62, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

HELP WANTED

Eastern city desires superintendent for Public Works Department. Department handles water, sewer and drain, highway, parks and forestry departments. If interested send qualifications to Box No. 12, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

EXCEPTIONAL BARGAINS

IMMEDIATE SHIPMENT

FOR SALE:

44C Barber-Greene Ditcher.
10S Koehring Mixer on 2 Pneumatic Tires.
4" Rex Self Priming Pump—Gasoline Power.

FOR RENT:

522 Barber-Greene Pneumatic Tired Bucket Loader—Gasoline Power.

PAUL L. MATCHETTE COMPANY
Exclusive Distributors for Barber-Greene Co.
Missouri — Kansas — Oklahoma
20 West 9th Street, Kansas City, Mo.

TIRE REPAIRS

In all sizes of tractor, truck, wheelbarrow, passenger, or 1800x24 tires.

An EQUA-FLEX "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!

We have pre-war quality used passenger, truck and some farm tractor tires.

WALLACE TIRE SERVICE, Inc.
2320 S. Michigan Ave. Chicago, Ill.

EQUIPMENT WANTED

Equipment Wanted

3 yard Diesel Dragline 80 to 100' boom
2 yard Diesel shovel
¼ yard shovel
Bulldozer
3—10 ton dump trucks

Box 51, Roads and Streets
330 South Wells Street, Chicago 6, Ill.

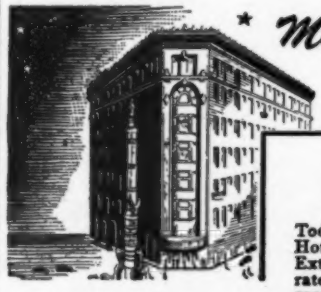
EQUIPMENT WANTED

Wanted: ¾ yard heavy duty gas or diesel crawler shovel for quarry work. 1935 model or later. Write with details to Box 14, Roads and Streets, 330 So. Wells St., Chicago 6, Ill.

"DUMMY JOINTS"

Add life to a concrete road by 'lessening' ruptures. They furnish means of expansion for the top portion of the paving. They should be installed at closer intervals transversely. Our installing devices make installation easy.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO, U. S. A.



Modernized..
Beautified..

Buffalo's Most Congenial Hotel

Today, you'll enjoy your stay at Hotel Lafayette more than ever! Extensively remodeled, and redecorated, this fine hotel offers new conveniences and comfort—but the friendly hospitality is the same as ever. Excellent food, homelike rooms, reasonable prices. And remember: Hotel Lafayette is Buffalo's most centrally located hotel. Moderate rates: Single, $2.75 up; Double, $4.50 up; special rates for 4 or more. Write for Folder R.

HOTEL LAFAYETTE, BUFFALO, N. Y. • • K. A. KELLY Manager

Books, Reports and Pamphlets Received

"Postwar Highway Planning," a bibliography prepared by the Automotive Safety Foundation, 321 Tower Bldg., Washington, D. C., includes a selective list of books, pamphlets and articles.

"Highway Slab-Bridges with Curbs; Laboratory Tests and Proposed Design Methods." By V. P. Jensen, R. W. Kluge and C. B. Williams, Jr., Engineering Experiment Station, Urbana, Ill.

"Fatigue Tests of Commercial Butt Welds in Structural Steel Plates," by W. M. Wilson, W. H. Bruckner, T. H. McCracken, Jr., and H. C. Bede, Engineering Experiment Station, Urbana, Ill.

"Ultimate Strength of Reinforced Concrete Beams as Related to the Plasticity Ratio of Concrete," by V. P. Jensen, Engineering Experiment Station, Urbana, Ill.

▼

Fourth Annual Report (1943) of Federal Works Agency, Washington, D. C. This 72-page Administrator's annual report to Congress is highlighted by such achievements as construction of the vast Hampton Roads water supply system, and the constituent Public Roads Administration's building of bridges in sub-zero temperatures on the Alaska Highway, blasting of the Inter-American Highway through tropic mountain barriers in Central America, flight strips in U. S., and other war contributions.

New Trade Literature

"WARTIME INFORMATION FOR THE DELIVERY TRUCK OPERATOR." Published by Studebaker Corporation, South Bend 27, Ind., and available on request, this 52-p. booklet gets down to brass tacks on truck conservation, covering everything from Air Cleaners to Weight Distribution, and giving latest ODT order data in Q. and A. manner. Of interest to highway and street departments, also contractors having truck fleets.

▼

"RESISTOFLEX PVA, A REMARKABLE ENGINEERING MATERIAL," is the title of a booklet issued by Resistoflex Corporation, Belleville, N. J., and available on request. It describes the properties of this material, which is a synthetic resin which when compounded and processed becomes a tough, strong, rubber-like material. Resistoflex automotive products of special interest to contractors and highway departments include hose in coils, hose assemblies for auto gas, oil and grease lines, oil filter assemblies for all common makes of filters (heavy-duty and wire braid).

▼

"LUBRICATION DATA ON CONTRACTORS' & AGRICULTURAL EQUIPMENT." A booklet by this name, covering recommended grades and uses of "Amalie" motor oil and petroleum products, is available on request. Contains summary of general lubrication requirements for typical machinery parts, tables of tractor oil capacities and recommendations, other valuable data. Address Amalie Division, Daugherty Refinery Division of L. Sonnenborn Sons, Inc., 88 Lexington Ave., New York City.

▼

BITUMINOUS CONSTRUCTION. The Cartwright Asphalt Equipment Co., Inc., Galion, O., has issued Bulletin 843 covering its full circulating "Hot Spray Bar." Cartwright engineers have recently prepared a "Chart for Good Distribution." Copies are available on request.

CONNERY'S
HEATING KETTLE
For speedy heating of tar and asphalt—
Use this CONNERY oil-burning Patrol Patching Heater on the small job and this CONNERY oil-burning kettle for large-quantity production.
Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.
CONNERY CONSTRUCTION Co.
3900 North Second St.
Philadelphia, Pa.

BURCH SCORES

For the removal of slush and ice from paved roads and for maintenance and shoulder work the BURCH TRUK PATROL makes a perfect score.

A curved cutting blade Hydromotor controlled gives this machine a wide operating range.

Manufactured by

The Burch Corporation

Crestline, Ohio

Equipment Since 1875

★

SUPPORT THE WAR EFFORT, BUY BONDS

Move MORE yardage for LESS money

Small Sauerman Scraper loads gravel from pit into trucks at rate of 48 cu. yd. an hour.

IT costs but a few cents per cubic yard to dig, haul and place a big load of any material with a SAUERMAN Power Drag Scraper or Slackline Cableway. The low cost and large capacity of these machines is proved daily on hundreds of jobs.

SAUERMAN Machines are designed in sizes and types to cover the requirements of every dig-and-haul job and each machine whether large or small, offers the greatest possible economy of power and labor. ***Write for Catalog.***

SAUERMAN BROS., INC.

588 S. Clinton St., Chicago 7

SAUERMAN
LONG RANGE MACHINES

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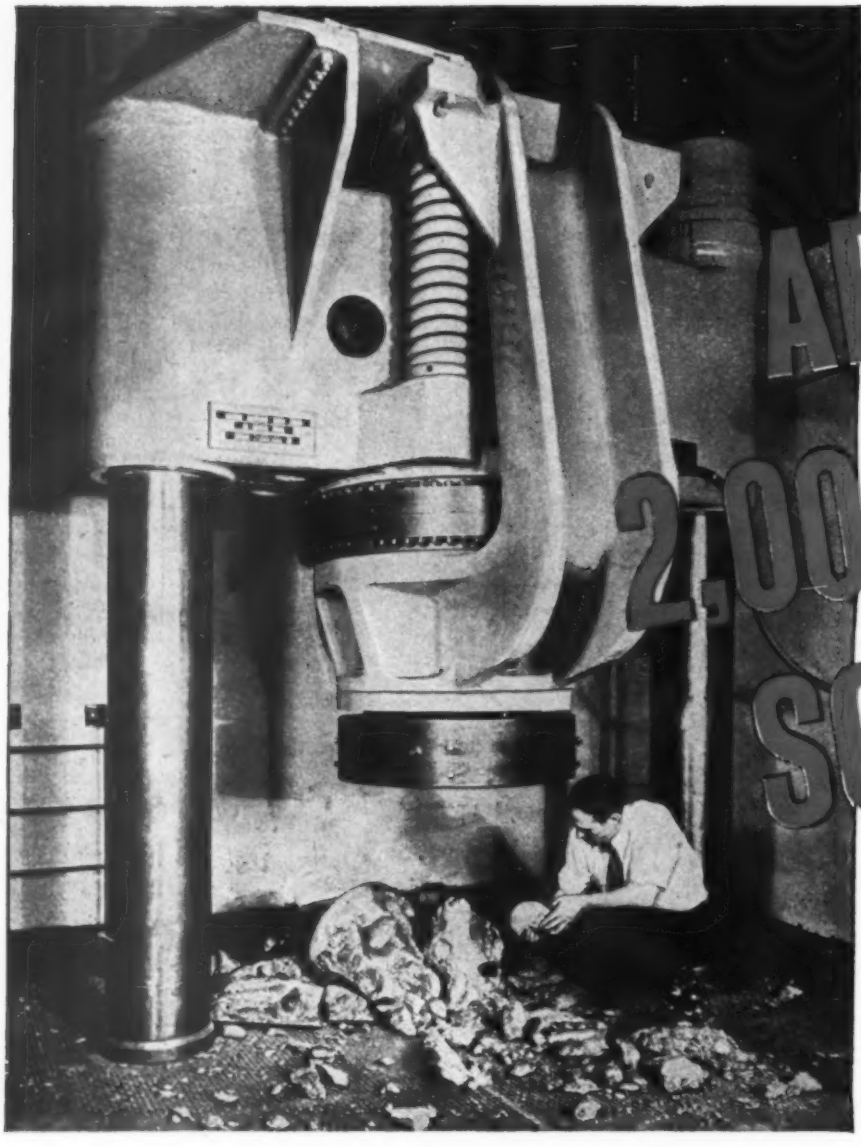

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